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ABSTRACT

This curriculum guide provides materials for a nine-duty course in carpentry. The nine duties are estimating materials, preparing building site, sharpening tools, building and installing foundation forms, installing rough framing, installing roof components, installing exterior finishes, installing interior finishes, and assembling and constructing stairs. Each duty consists of a number of job-relevant tasks. These components are provided for each task: performance objective (task, standard of performance of task, source of standard, conditions for performance of task), enabling objectives, resource(s), teaching activities, criterion-referenced measure (questions, answers, practical application, method of evaluating practical application), and checklist for the student evaluation. Appendixes include a task list with job titles, definition of terms, list of tools and equipment, list of sources of standards, a bibliography of state-of-the-art literature, and a bibliography compiled by the writing team. (YLB)

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V-TECS GUIDE

FOR

CARPENTER

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INTRODUCTION

A V-TECS Guide is an extension or a continuation of one or more V-TECS Catalogs. The V-TECS Catalog is a composition of duties, tasks, performance objectives, and performance guides which deal with the psychomotor aspect of an occupation. The catalog can be considered the blueprint of an occupation.

The catalog serves as the foundation for the V-TECS Guide. Experience has shown that the art of learning can be taught while teaching subject matter. A V-TECS Guide provides an efficient method for this process. The Guide addresses the three domains of learning: psychomotor, cognitive, and affective. The following is a brief explanation of each.

Psychomotor

Manipulative skills, such as sharpening a pencil and making a bulletin board display, are representative of activities that are psychomotor in nature. These tasks are identified in a catalog and grouped by duties and objectives. Each performance objective has a performance standard which must be met to demonstrate student proficiency in the manipulative aspect of the task.

Cognitive

Cognition is the mental process by which knowledge is acquired. To perform psychomotor tasks, students must think. Effective thinking is necessary for successful performance of job tasks. Students gain cognition through real and vicarious experiences. This guide enables the instructor to provide decision-making opportunities for students, thus developing their cognitive skills.

Affective

The affective domain deals with attitudes, interests, and values development. Desirable behavior is the learning outcome of the affective domain. This guide presents activities created to promote an understanding of self and others in a working environment. The instructor is encouraged to use the activities to stress how attitudes, values, and goal attainment influence working relationships and productivity.

USE OF V-TECS GUIDE

A V-TECS Guide is designed to provide job-relevant tasks, performance objectives, performance guides, resources, teaching activities, evaluation standards, and criterion-referenced measures. It may be used with any teaching method the instructor chooses. Although a guide contains suggestions for specific classroom activities for each identified task, teachers are encouraged to be creative in adapting the material to meet the particular needs of their students.

ESTIMATING MATERIALS

DUTY ESTIMATING MATERIALS

PERFORMANCE OBJECTIVE 1

TASK

Estimate forming materials

STANDARD OF PERFORMANCE OF TASK

Forming materials must cover contact area of elements with no more than ten percent waste allowance or within permissible allowance of specified order and class of job.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Plans and specifications

ENABLING OBJECTIVES

1. Calculate linear feet.
2. Use basic math skills.
3. Recognize forming parts.

RESOURCE

Spence. **General Carpentry**, pp. 131-164.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry**, p. 164.
2. Explain the approximate way to read a work order.
3. Visit a worksite and observe the form builders construct a form.
4. Explain the purpose of having a building code.
5. Have students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 1

CRITERION-REFERENCED MEASURE

Questions

1. A concrete pad placed on the soil is called the __________ .
2. Most complex, special-built forms use __________ as the surface material.
3. A carpenter must carefully read the ____________ so that the forms are the proper size.

Answers

1. Footing
2. Plywood
3. Blueprints

Practical Application

Have the students estimate forming material with no more than ten percent waste.

Method of Evaluating Practical Application

Use Checklist Performance Objective 1 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 1 EVALUATION

ESTIMATING FORM MATERIALS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications for contact areas.		
2. Determined number and types of forming materials required.		
3. Determined dimensions for each form from plans.		
4. Determined linear feet of forming materials.		
5. Listed all footers, column footers, piers and columns, walls, beams, supported slabs, and slabs-on-grade by type and size.		
6. Multiplied form size by total numbers required for each type of forming material.		
7. Recorded calculations by type and size.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY ESTIMATING MATERIALS

PERFORMANCE OBJECTIVE 2

TASK

Estimate concrete

STANDARD OF PERFORMANCE OF TASK

Volume of concrete must be in cubic yards, with no more than a two and one half percent waste allowance or within permissible allowance of specified order and class of job.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Plans and specifications

ENABLING OBJECTIVES

1. Solve problems with fractions.
2. Read a purchase order.

RESOURCE

Spence. **General Carpentry**, p. 164.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, p. 164.
2. Explain why concrete is ordered in cubic yards.
3. Explain the formula to figure yards of concrete.
4. Practice using formula to estimate cubic yards.
5. Have students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 2

CRITERION-REFERENCED MEASURE

Questions

1. Concrete is measured and sold by the __________ __________.
2. Some contractors use __________ to estimate concrete because it is faster and there is less chance to make a mistake.
3. The formula for calculating cubic yards is __________.

Answers

1. Cubic yards
2. Tables
3. Cubic yards = $\frac{\text{Width (ft)} \times \text{Length (ft)} \times \text{thickness (ft)}}{27}$

Practical Application

Given the dimensions of a driveway, the students will estimate the amount of concrete needed with no more than ten percent waste.

Method of Evaluating Practical Application

Use Checklist Performance Objective 2 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 2 EVALUATION

ESTIMATING CONCRETE

Student's Name **Date**

DIRECTIONS TO STUDENT — Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR — Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Determined length of form(s) in feet or fractions of one foot.		
3. Determined width of form(s) in feet or fractions of one foot.		
4. Determined depth of form(s) in feet or fractions of one foot.		
5. Multiplied depth by width by length.		
6. Converted to cubic yardage by dividing by 27.		
7. Recorded calculations.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY ESTIMATING MATERIALS

PERFORMANCE OBJECTIVE 3

TASK

Estimate concrete block

STANDARD OF PERFORMANCE OF TASK

Quantity of concrete blocks must be of dimensions specified on plans and specifications with no more than three percent waste allowance or within permissible allowance of specified order and class of job.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Plans and specifications

ENABLING OBJECTIVES

1. Read masonry section of blueprint.
2. Use basic math skills.
3. Read a purchase order.

RESOURCE

Feirer, et al., **Carpentry and Building Construction**, pp. 247-273.

TEACHING ACTIVITIES

1. Have students read and discuss **Carpentry and Building Construction**, pp. 247-273.
2. Explain how to calculate the area of a wall.
3. Have the students measure the actual size of a block.
4. Construct a standard 8" block estimating table.
5. Have students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 3

CRITERION-REFERENCED MEASURE

Questions

1. Blocks should be laid so that the surfaces with the __________ holes are up.
2. The block which fills the final gap in a course between corners is called the __________ block.
3. The number of block necessary for a building can be determined by the __________ of the wall to be built.

Answers

1. Smaller
2. Closure
3. Area

Practical Application

Given the area of a wall, the students will estimate the number of block with no more than ten percent waste.

Method of Evaluating Practical Application

Use Checklist Performance Objective 3 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 3 EVALUATION

ESTIMATING CONCRETE BLOCK

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Determined dimensions of blocks required from plans.		
2. Determined length in feet.		
3. Determined height from plans.		
4. Multiplied length by height to determine square footage (area) of wall.		
5. Determined area of openings in wall.		
6. Subtracted area of openings from area of wall.		
7. Multiplied wall area by 1.125 (for standard hollow core or solid blocks) to determine number of pieces.		
8. Calculated wall areas for each thickness of blocks.		
9. Totaled number of blocks for each wall area by thickness.		
10. Recorded calculations.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY ESTIMATING MATERIALS

PERFORMANCE OBJECTIVE 4

TASK

Estimate rough framing materials

STANDARD OF PERFORMANCE OF TASK

Measurements for plates, joists, rafters, joist bridging, blocking, and bracing must be rounded upward to even footage for each length required and totaled in linear feet. Studs must be of quantity sufficient to complete wall framing with fifteen percent allowance for exterior wall bracing and corner posts, and fifteen percent allowance for interior wall bracing and corner posts. Headers and studs must be measured in lengths rounded upward to even footage; trusses must be of sufficient size and number to meet specifications for size and pitch of roof. Measurements to determine square footage for each surface to receive plywood sheeting must be rounded upward to even feet. Plywood sheeting must cover specified areas with no more than five percent waste allowance or within permissible allowance of specified order and class of job.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Plans and specifications

ENABLING OBJECTIVES

1. Read a blue print.
2. Use basic math skills.
3. Identify framing materials.
4. Prepare a material list.

RESOURCE

Spence. **General Carpentry**, pp. 166-264.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry**, pp. 166-264.
2. Have the students identify each of the framing members to be estimated.
3. Visit a worksite and observe the purpose of each framing member.
4. List each type of framing member and explain how to apply the proper formula for estimating each.
5. Demonstrate how to record each estimation.
6. Have students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 4

CRITERION-REFERENCED MEASURE

Questions

1. The most commonly used framing in residential construction is called ________________ framing.
2. The layer of sheathing placed directly over the floor joists is called the __________.
3. The first step in constructing the wall is to mark the __________ and __________ plates.

Answers

1. Platform
2. Subfloor
3. Sole and top

Practical Application

Given the dimensions of a frame structure, the students will estimate the materials needed with no more than ten percent waste.

Method of Evaluating Practical Application

Use Checklist Performance Objective 4 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 4 EVALUATION

ESTIMATING ROUGH FRAMING MATERIALS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Determined size and number of rough framing members from plans and specifications. For plates a. Determined length of each foundation wall in linear feet. b. Rounded upward to even feet. c. Determined nominal length required. d. Totaled linear feet for common plate sizes. e. Divided nominal size into total footage for number of lengths required. f. Recorded calculations. For joists and rafters a. Determined length of member. b. Rounded upward to even feet. c. Counted number of required lengths. d. Doubled number of lengths for joists under partitions and around stairwells. e. Totaled number of lengths required. f. Determined materials for all sizes of joists and rafters. g. Recorded calculations.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 4 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
For joist bridging a. Determined size and spacing of bridging from plans. b. Determined linear footage of one length of bridging between joists. c. Rounded upward to even feet. d. Determined total linear feet of bridging required. e. Determined materials for all sizes of bridging. For studs a. Determined size and spacing of studs from plans. b. Calculated perimeter of exterior walls. c. Determined number of studs required to frame exterior walls adding an additional fifteen percent for bracing, corner posts, etc. d. Recorded total number of studs by length required for exterior walls. e. Rounded upward to even feet. f. Totaled linear feet of interior wall partitions. g. Determined number of studs required to frame interior walls adding an additional fifteen percent for bracing, corner posts, etc. h. Round upward to even feet for each size of stud. i. Recorded total number of studs by length required for interior walls. j. Added totals for exterior and interior studs by length.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 4 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
For trusses a. Determined size and pitch of roof from plans and specifications. b. Calculated sizes and number of trusses. c. Totaled number of trusses by size and type. d. Recorded calculations.		
For headers a. Determined width of all rough openings to receive headers from plans and specifications. b. Determined lengths required. c. Rounded upward to even feet for each length. d, Totaled number of members by lengths. e. Recorded calculations.		
For bracing and blocking a. Determined lengths of members required from plans and specifications. b. Totaled linear feet of blocking and bracing. c. Recorded calculations.		
For plywood a. Determined sizes, grades, and types of plywood required from plans and specifications. b. Determined lengths and widths of each surface to receive plywood rounding upward to even feet. c. Multiplied length by width of each surface to determine square footage (area).		

CHECKLIST FOR PERFORMANCE OBJECTIVE 4 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
d. Multiplied length by width of single plywood sheet to obtain square footage of unit coverage. e. Divided square footage of each surface area by square footage of one plywood sheet to determine number of sheets required for each surface. f. Determined total number of sheets of plywood by size, grade, and type of sheeting. g. Recorded calculations.		
2. Listed all quantities of members by: type, size, and grade of lumber.		

APPROVED: YES _____ NO ____

Evaluator's Signature Date

DUTY ESTIMATING MATERIALS

PERFORMANCE OBJECTIVE 5

TASK

Estimate roofing materials

STANDARD OF PERFORMANCE OF TASK

Roofing materials must cover entire roof area with no more than five percent waste allowance for vapor barriers, insulation, and roofing paper or within permissible allowance of specified order and class of job.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Plans and specifications

ENABLING OBJECTIVES

1. Use basic math skills.
2. Prepare a purchase order.
3. Measure the size of a roof.

RESOURCE

Feirer, et al., **Carpentry and Building Construction**, pp. 554-555.

TEACHING ACTIVITIES

1. Have students read and discuss **Carpentry and Building Construction**, pp. 554-555.
2. Explain how to calculate the area of a roof.
3. Identify types of roofing material, barriers and paper.
4. Demonstrate how to lay shingles so that the students can relate to the method of estimation.
5. Have the students measure the width and length of a building.
6. Have the students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 5

CRITERION-REFERENCED MEASURE

Questions

1. Metal or some other material placed where special protection is needed to prevent water from entering is called __________.
2. Roofing is estimated and sold by the __________.
3. The amount that a shingle is exposed on the distance from the butt of one shingle to the butt of the one directly above is called the __________.

Answers

1. Flashing
2. Square
3. Exposure

Practical Application

Given the area of a roof, the students will estimate the squares of shingles needed, to cover it, with no more than ten percent waste.

Method of Evaluating Practical Application

Use Checklist Performance Objective 5 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 5 EVALUATION

ESTIMATING ROOF MATERIALS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Determined type of roof and materials from plans and specifications.		
2. Determined length and width of roof surface.		
3. Multiplied length by width to determine square feet of area.		
4. Divided square feet by 100 to determine number of squares. For sloped roof a. Recorded paper, required insulation and roofing materials in squares. b. Determined linear feet of hips and ridge. c. Determined linear feet of valleys for flashing. d. Measured linear feet of gutters and downspouts. e. Counted roof vents by size. f. Counted roof stacks by size. g. Recorded calculations.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 5 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
For flat roof a. Recorded vapor barriers, insulation, and roofing materials in squares. b. Determined length of abutting walls. c. Determined length of parapets of roof edges. d. Counted number of roof penetrations and roof openings. e. Recorded required quantities of cants, cap and base flashing, copings, fascia, penetrations, and roof accessories.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY ESTIMATING MATERIALS

PERFORMANCE OBJECTIVE 6

TASK

Estimate windows

STANDARD OF PERFORMANCE OF TASK

Number, style, and size of windows must be as specified on plans and specifications.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Plans and specifications

ENABLING OBJECTIVES

1. Read a blueprint.
2. Recognize a window schedule.

RESOURCE

Spence. **General Carpentry**, p. 299.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry**, p. 299.
2. Explain how to differentiate various window styles.
3. Have a student discuss the window code on a blueprint.
4. Have the students locate windows on a blueprint.
5. Have the students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 6

CRITERION-REFERENCED MEASURE

Questions

1. The carpenter receives the window unit ready to install in the ____________ ____________.
2. Double hung windows are sliding units that move ____________.
3. ____________ windows are made of many narrow horizontal glass slats.

Answers

1. Rough opening
2. Vertically
3. Jalousie

Practical Application

Have the students prepare a window schedule, from a blueprint, listing the number, sizes and styles of windows needed.

Method of Evaluating Practical Application

Use Checklist Performance Objective 6 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 6 EVALUATION

ESTIMATING WINDOWS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications.		
2. Counted windows.		
3. Grouped windows according to sizes and style.		
4. Recorded calculations.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY ESTIMATING MATERIALS

PERFORMANCE OBJECTIVE 7

TASK

Estimate doors and jambs

STANDARD OF PERFORMANCE OF TASK

Number, style, and size of doors and jambs must be as specified on plans and specifications

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Plans and specifications

ENABLING OBJECTIVES

1. Read a blueprint.
2. Add and multiply numbers.
3. Prepare a list of materials.

RESOURCE

Spence. **General Carpentry**, pp. 85-86, 303-306.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry**, pp. 85-86, 303-306.
2. Explain the purpose of a door schedule.
3. Identify the parts of a door jamb.
4. Have the students locate and identify doors on a blueprint.
5. Explain the purpose of various types of doors.
6. Have the students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 7

CRITERION-REFERENCED MEASURE

Questions

1. Exterior doors must have ____________ on all sides.
2. The carpenter receives the door unit ready to install in the ____________ ____________.
3. The part of the door frame which fits inside the masonry opening or rough frame opening is called the ____________ .

Answers

1. Weatherstripping
2. Rough opening
3. Door jamb

Practical Application

Have the students estimate doors and jambs with no more than ten percent waste.

Method of Evaluating Practical Application

Use Checklist Performance Objective 7 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 7 EVALUATION

ESTIMATING DOORS AND JAMBS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications and/or door schedule.		
2. Determined sizes and types of materials required.		
3. Counted number of doors.		
4. Grouped doors according to size and composition.		
5. Multiplied number of doors by 14 to determine linear footage of jamb leg material.		
6. Added widths of all rough openings to determine linear footage of jamb header material.		
7. Recorded calculations.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY ESTIMATING MATERIALS

PERFORMANCE OBJECTIVE 8

TASK

Estimate interior underlayment

STANDARD OF PERFORMANCE OF TASK

Underlayment must cover floor with no more than five percent waste allowance or within permissible allowance of specified order and class of job.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Plans and specifications

ENABLING OBJECTIVES

1. Read a purchase order.
2. Use formula to find area.
3. Multiply and divide whole numbers.

RESOURCE

Spence. **General Carpentry**, pp. 189-192.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry**, pp. 189-192.
2. Explain the purpose of interior underlayment.
3. Have the students use a tape measure to determine the size of a floor.
4. Show the students how to stagger the joints in subfloor sheets.
5. Compare sheets of underlayment with solid wood subflooring.
6. Identify three types of flooring underlayment.
7. Have students complete the performance of the task on the worksheet.

PERFORMANCE OBJECTIVE 8

CRITERION-REFERENCED MEASURE

Questions

1. The layer of sheeting placed directly over the floor joists is called the ___________.
2. If solid wood boards are used, the ends should always rest on a ___________.
3. The panels should be ___________ so that the end joints occur at different joists.

Answers

1. Subfloor
2. Joist
3. Staggered

Practical Application

Have the students estimate interior underlayment with no more than ten percent waste.

Method of Evaluating Practical Application

Use Checklist Performance Objective 8 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 8 EVALUATION

ESTIMATING INTERIOR UNDERLAYMENT

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Determined length of floor in feet.		
3. Determined width of floor in feet.		
4. Rounded measurements upward to even feet.		
5. Multiplied length by width to determine square footage (area) of floor surface.		
6. Multiplied length by width of single underlayment sheet specified to obtain square footage (area) of unit coverage.		
7. Divided floor area by square footage of one sheet of underlayment to determine total number of sheets.		
8. Rounded figure upward to nearest full sheet.		
9. Recorded estimate of material.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY ESTIMATING MATERIALS

PERFORMANCE OBJECTIVE 9

TASK

Estimate interior paneling

STANDARD OF PERFORMANCE OF TASK

Paneling must cover specified walls with no more than five percent waste allowance or within permissible allowance of specified order and class of job.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Plans and specifications

ENABLING OBJECTIVES

1. Read a tape measure.
2. Apply basic math.
3. Identify various types of paneling.

RESOURCE

Spence. **General Carpentry,** pp. 382-395.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry**, pp. 382-395.
2. Explain how much to deduct because of doors, windows and fireplaces.
3. Debate why a hairline crack is left between panels.
4. Describe how panels should be stored.
5. Have the students practice measuring the perimeter of a room and dividing by four.
6. Have students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 9

CRITERION-REFERENCED MEASURE

Questions

1. A hairline crack between panels allows for ___________.
2. When installing panels horizontally, ___________ is needed to support the joint in the center of the wall.
3. Masonry walls are usually ___________ out to receive paneling.

Answers

1. Expansion
2. Blocking
3. Furred

Practical Application

Have the students estimate the number of panels for a room with no more than ten percent waste.

Method of Evaluating Practical Application

Use Checklist Performance Objective 9 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 9 EVALUATION

ESTIMATING INTERIOR PANELING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Determined length of walls in feet.		
3. Determined height of walls in feet.		
4. Rounded measurements upward to even feet.		
5. Multiplied length by height to determine square footage (area) of wall surface.		
6. Determined length and width of paneling.		
7. Multiplied length by width of paneling to determine square footage (area) of unit coverage.		
8. Divided wall area by unit coverage to determine number of panels.		
9. Recorded estimate of materials.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY ESTIMATING MATERIALS

PERFORMANCE OBJECTIVE 10

TASK

Estimate stairway materials

STANDARD OF PERFORMANCE OF TASK

Materials must be sufficient to build stairway as specified on plans. For metal pan stairs there must be no more than two and one half percent waste allowance for concrete or within permissible allowance of specified order and class of job.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Plans and specifications

ENABLING OBJECTIVES

1. Read a purchase order.
2. Multiply and divide numbers.
3. Read a tape measure.

RESOURCE

Spence. **General Carpentry**, pp. 428-448.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry**, pp. 428-448.
2. Have the students name and describe structural stair parts.
3. Show the difference between structural parts and finished stair parts.
4. Explain the difference between open and closed stairs.
5. Demonstrate on a framing square how to step off a standard stair horse.
6. Explain the total run and rise.
7. Have students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 10

CRITERION-REFERENCED MEASURE

Questions

1. A horizontal area in the middle of a long stair is called a __________.
2. The total vertical distance from one floor to the next is called the __________ __________.
3. The total horizontal length of the stair is called the __________ __________.

Answers

1. Landing
2. Total rise
3. Total run

Practical Application

Have the students estimate stair material with no more than ten percent waste.

Method of Evaluating Practical Application

Use Checklist Performance Objective 10 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 10 EVALUATION

ESTIMATING STAIR MATERIAL

Student's Name **Date**

DIRECTIONS TO STUDENT	Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.
DIRECTIONS TO EVALUATOR	Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications. For wood stairways a. Determined length of one stringer. b. Multiplied length by 2 for footage of stringers. c. Determined vertical rise in inches. d. Determined number of treads and risers. e. Determined length of hand rails. f. Determined number and length of balusters. For metal pan stairs a. Determined number and size of stairways required. b. Estimated concrete. c. Determined number, size, and materials of tread coverings, riser covering, platform coverings, handrails, and balusters.		
2. Recorded estimates according to grade, type, and size of materials.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY ESTIMATING MATERIALS

PERFORMANCE OBJECTIVE 11

TASK

Estimate closet accessories

STANDARD OF PERFORMANCE OF TASK

Trim supports must be sufficient to support closet shelving; bracket supports must support shelving every 24 inches and waste allowance for closet accessories must not exceed five percent or permissible waste allowance of specified order and class of job.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Plans and specifications

ENABLING OBJECTIVES

1. Read a tape measure.
2. Read specified work order.
3. Use basic math.

RESOURCE

Feirer, et al., **Carpentry and Building Construction**, pp. 947-949.

TEACHING ACTIVITIES

1. Have students read and discuss **Carpentry and Building Construction**, pp. 947-949.
2. Have the students locate a closet on a blueprint.
3. Demonstrate how to measure linear feet.
4. Show the students the purpose of a bracket support.
5. Discuss different types of trim supports.
6. Have students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 11

CRITERION-REFERENCED MEASURE

Questions

1. The standard height for a clothes closet shelf is:
   - a. 66 in.
   - b. 56 in.
   - c. 52 in.
   - d. 76 in.

2. Bracket supports must support shelving every:
   - a. 18 in.
   - b. 16 in.
   - c. 24 in.
   - d. 30 in

3. If ceiling molding were to be installed in a room 8′ x 6′, the total amount of molding installed would be:
   - a. 36′
   - b. 30′
   - c. 28′
   - d. 24′

Answers

1. a
2. c
3. c

Practical Application

Given the size of a closet, the students will estimate the accessories needed with no more than ten percent waste.

Method of Evaluating Practical Application

Use Checklist Performance Objective 11 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 11 EVALUATION

ESTIMATING CLOSET ACCESSORIES

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications.		
2. Determined length of closet.		
3. Determined number of shelves from specifications.		
4. Determined number of closet rods from specifications.		
5. Multiplied number of shelves by length of closet to determine linear feet of shelving.		
6. Calclated support materials necessary for one of the following support methods: a. Bracket supports: 1. Allow one bracket support per 24 inches of shelving. b. Trim supports: 1. Add 3 feet to each closet length. 2. Multiply total by number of shelves per closet. 3. Calculate total linear feet of shelving for all closets.		
7. Recorded calculations.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY ESTIMATING MATERIALS

PERFORMANCE OBJECTIVE 12

TASK

Estimate acoustical ceiling material

STANDARD OF PERFORMANCE OF TASK

Acoustical ceiling tiles must cover ceiling area and furring strips must be of sufficient length and number.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Plans and specifications

ENABLING OBJECTIVES

1. Read a tape measure.
2. Identify various types of ceiling material.
3. Solve basic math problems.

RESOURCE

Feirer, et al., **Carpentry and Building Construction**, pp. 780-798.

TEACHING ACTIVITIES

1. Have students read and discuss **Carpentry and Building Construction**, pp. 780-798.
2. Explain to students the purpose of furring strips.
3. Have students practice measuring the size of a room.
4. Describe various types and sizes of ceiling material.
5. Demonstrate to students the various ways of attaching ceiling tiles.
6. Have the students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 12

CRITERION-REFERENCED MEASURE

Questions

1. If the ceiling is in poor condition, it is best to apply the tiles to ____________ strips.
2. Ceilings that may be used to lower a high ceiling or to conceal overhead piping are called ____________ ceilings.
3. Correct uneven furring strips by driving ____________ between the strips and the joists.

Answers

1. Furring
2. Suspended
3. Shims

Practical Application

Have the students estimate the acoustical material for a ceiling with no more than ten percent waste.

Method of Evaluating Practical Application

Use Checklist Performance Objective 12 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 12 EVALUATION

ESTIMATING ACOUSTICAL CEILING MATERIAL

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications.		
2. Determined length and width of ceiling area.		
3. Multiplied length by width to determine square footage (area) of ceiling area.		
4. Multiplied length by width of single acoustical tile to determine square footage (area) of unit coverage.		
5. Divided total surface area of ceiling by square footage of one acoustical tile to determine total number of tiles.		
6. Calculated linear footage of furring strips required in accordance with specified tile size and run of overhead joists.		
7. Recorded calculations.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY ESTIMATING MATERIALS

PERFORMANCE OBJECTIVE 13

TASK

Estimate prefabricated cabinets

STANDARD OF PERFORMANCE OF TASK

Cabinets must be of specified style and type; cabinets must fit into area provided to receive cabinets with allowance provided for doors, drawers, and windows. Spacers must cover exposed openings in multi-cabinet faces.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Plans and specifications

ENABLING OBJECTIVES

1. Read a blue print.
2. Read a tape measure.
3. Use basic math skills.

RESOURCE

Feirer. **Cabinetmaking and Millwork**, pp. 731-745.

TEACHING ACTIVITIES

1. Have students read and discuss **Cabinetmaking and Millwork**, pp. 731-745.
2. Visit a site where cabinets are being installed.
3. Explain the standard height and depth of cabinets.
4. Have the students sketch a kitchen cabinet and show the accessories on the drawing.
5. Have the students discuss a cabinet design of their own.
6. Have the students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 13

CRITERION-REFERENCED MEASURE

Questions

1. Wall cabinets are fastened to masonry walls with ______________________.
2. The space at the base of the cabinet is called a ___________ space.
3. If the wall is irregular, it may be necessary to place ___________ beyond the cabinet.

Answers

1. Toggle bolts
2. Toe
3. Shims

Practical Application

The students will estimate the number of prefabricated cabinets for a specified area one hundred percent accuracy.

Method of Evaluating Practical Application

Use Checklist Performance Objective 13 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 13 EVALUATION

ESTIMATING PREFABRICATED CABINETS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Layed out floor and wall plan of cabinets according to plans and specifications.		
2. Determined dimensions of cabinet spacers required including allowances for drawer, door openings, windows, etc.		
3. Counted number of base and wall cabinets.		
4. Counted required accessories by size and type.		
5. Determined linear footage of countertops.		
6. Recorded cabinet and accessory estimates by size, style, type, and quantity.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY ESTIMATING MATERIALS

PERFORMANCE OBJECTIVE 14

TASK

Estimate material for built-ins

STANDARD OF PERFORMANCE OF TASK

Material must be sufficient to form built-in unit with no more than ten percent waste allowance or within permissible allowance of specified order and class of job.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Plans and specifications

ENABLING OBJECTIVES

1. Read a blueprint.
2. Read a tape measure.
3. Use basic math skills.
4. Prepare a purchase order.

RESOURCE

Feirer. **Cabinetmaking and Millwork**, pp. 746-752.

TEACHING ACTIVITIES

1. Have students read and discuss **Cabinetmaking and Millwork**, pp. 746-752.
2. Visit a site where cabinets are being installed.
3. Sketch a set of basic kitchen cabinets.
4. List the names of the basic cabinet parts.
5. Have a student show on a set of blueprints where a cabinet is installed.
6. Explain the difference between the frame and non-frame construction.
7. Have students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 14

CRITERION-REFERENCED MEASURE

Questions

1. Plastic laminate is commonly fastened to the countertop with ____________ cement.
2. Cabinets built on site by the craftsman are called ____________________.
3. If the base or wall cabinet is to turn a ninety degree corner, the walls must be checked for ____________.

Answers

1. Contact
2. Built-ins.
3. Squareness

Practical Application

Given a set of blueprints, the students will estimate the material needed to build a set of built-ins with no more than ten percent waste.

Method of Evaluating Practical Application

Use Checklist Performance Objective 14 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 14 EVALUATION

ESTIMATING MATERIAL FOR BUILT-INS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications for locations and dimensions.		
2. Determined length, depth, and height of area to receive built-in.		
3. Multiplied length by depth to determine square footage (area) of horizontal surface.		
4. Multiplied height by depth to determine square footage (area) of vertical (side) surface.		
5. Multiplied length by height to determine square footage (area) of face surface.		
6. Determined sizes of material to be used for each surface.		
7. Totaled sizes of material needed for all built-ins.		
8. Recorded calculations.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY ESTIMATING MATERIALS

PERFORMANCE OBJECTIVE 15

TASK

Estimate finish hardware

STANDARD OF PERFORMANCE OF TASK

Finish hardware must be sufficient to meet needs in quantity, size, and style.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Plans and specifications

ENABLING OBJECTIVES

1. Add whole numbers.
2. Identify various hardware types.
3. Read a purchase order.

RESOURCE

Feirer. **Cabinetmaking and Millwork**, pp. 162-166.

TEACHING ACTIVITIES

1. Have students read and discuss **Cabinetmaking and Millwork**, pp. 162-166.
2. Identify a variety of door hinges and pulls to students.
3. Describe the types of drawer guides.
4. Compare slides, locks, pulls and hinges in lower and higher quality pieces.
5. Demonstrate the number of hinges needed in small and larger doors.
6. Draw a rough sketch of a cabinet showing the location of hinges and pulls.
7. Have students complete the performance of the task on the worksheet.

PERFORMANCE OBJECTIVE 15

CRITERION-REFERENCED MEASURE

Questions

1. A square or rectangular hinge usually with a loose pin, generally used for hanging doors is called a ____________ hinge.
2. A ____________ hinge fits on the rabbeted edge that overhangs the frame.
3. When installing hardware, carefully follow the ____________ included in the package.

Answers

1. Butt
2. Lipped
3. Instructions

Practical Application

Given the type and number of doors on a cabinet, the students will estimate the finish hardware with one hundred percent accuracy.

Method of Evaluating Practical Application

Use Checklist Performance Objective 15 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 15 EVALUATION

ESTIMATING FINISH HARDWARE

Student's Name **Date**

DIRECTIONS TO STUDENT — Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR — Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications.		
2. Determined hardware needs for: a. Passage latch sets b. Passage lock sets c. Keyed entrance locks d. Mortise locks e. Deadbolts f. Cabinet pulls g. Hinge sets		
3. Noted any variations in size and style.		
4. Recorded total number of each type of hardware required.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY ESTIMATING MATERIALS

PERFORMANCE OBJECTIVE 16

TASK

Estimate siding

STANDARD OF PERFORMANCE OF TASK

Siding must be of material specified on plans and specifications and must cover wall areas with no more than ten percent waste allowance or within permissible allowance of specified order and class of job.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Plans and specifications

ENABLING OBJECTIVES

1. Read an elevation drawing.
2. Use a tape measure.
3. Read a purchase order.
4. Multiply and divide numbers.

RESOURCE

Capotosto. **Basic Carpentry**, pp. 329-349.

TEACHING ACTIVITIES

1. Have students read and discuss **Basic Carpentry**, pp. 329-349.
2. Describe and identify the different types of siding.
3. Explain the sizes and various qualities of siding.
4. Demonstrate how corners are formed.
5. Discuss how to obtain required exposure on lap sidings.
6. Illustrate how to lay out wood shingles and shakes.
7. Have students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 16

CRITERION-REFERENCED MEASURE

Questions

1. Before installing siding __________ paper must be laid over lumber sheathing .
2. When installing horizontal siding a __________ __________ is used to insure accuracy .
3. A bead of __________ at door and window joints help keep out moisture.

Answers

1. Waterproof
2. Story pole
3. Caulking

Practical Application

The students will estimate the amount of siding to cover a wall with no more than ten percent waste.

Method of Evaluating Practical Application

Use Checklist Performance Objective 16 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 16 EVALUATION

ESTIMATING SIDING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Determined length and height of wall.		
3. Multiplied length by height to determine square footage (area) of wall surface.		
4. Determined length and width of siding (panel or board).		
5. Multiplied length by width to determine square footage (area) per unit of material.		
6. Divided square feet of wall surface by square feet of one material unit to determine quantity needed.		
7. Recorded estimates.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

PREPARING BUILDING SITE

DUTY PREPARING BUILDING SITE

PERFORMANCE OBJECTIVE 17

TASK

Establish elevation reference points from bench mark

STANDARD OF PERFORMANCE OF TASK

Elevation reference points must be accurate to within ± 0.10 feet or within permissible tolerances of specified order and class of accuracy for job.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Builder's level
Engineer's rod
Grade stake
Plans and specifications
Sledge hammer
Straight stock

ENABLING OBJECTIVES

1. Read a tape measure.
2. Read a building site plan.
3. Use a builder's level.

RESOURCE

Capotosto. **Basic Carpentry**, pp. 126-127.

TEACHING ACTIVITIES

1. Have students read and discuss **Basic Carpentry**, pp. 126-127.
2. Demonstrate to students how to locate main reference point.
3. Have the students explain the proper method to set up the builder's level.
4. Demonstrate to students the proper use of an engineer's rod.
5. Have the students practice setting up the builder's level and engineer's rod.
6. Have the students establish elevations reference points from a bench mark using the checklist for performance objectives and evaluation.

PERFORMANCE OBJECTIVE 17

CRITERION-REFERENCED MEASURE

Questions

1. Grade elevations are usually related to a reference point on the job called the ____________ ____________.
2. For small home construction, a ____________ ____________ may be used instead of the leveling rod.
3. The circle contains ________________ degrees and each degree has ____________ minutes.

Answers

1. Bench mark
2. Folding rule
3. 360, 60

Practical Application

Given a predetermined bench mark, the students will establish elevation reference points to an accuracy of ± 0.10 feet.

Method of Evaluating Practical Application

Use Checklist Performance Objective 17 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 17 EVALUATION

ESTABLISHING ELEVATION REFERENCE POINTS FROM BENCH MARK

Student's Name **Date**

DIRECTIONS TO STUDENT	Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.
DIRECTIONS TO EVALUATOR	Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Located bench mark at building site.		
2. Measured distance and direction of approximate area of construction from bench mark using plans and specifications.		
3. Sat grade stake at reference point within approximate area of construction.		
4. Set and leveled builder's level.		
5. Checked bench mark elevation using builder's level.		
6. Placed engineer's rod at bench mark.		
7. Took reading to establish bench mark elevation.		
8. Placed engineer's rod at reference point.		
9. Adjusted elevation of engineer's rod to bench mark reading.		
10. Marked elevation on grade stake.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY PREPARING BUILDING SITE

PERFORMANCE OBJECTIVE 18

TASK

Establish footing grade

STANDARD OF PERFORMANCE OF TASK

Story pole must be marked to indicate builder's level, bench mark and footing grade; story pole must be accurate to ± 0.10 feet or within permissible tolerances of specified order and class of job.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Builder's level
Plans and specifications
Sledge hammer
Straight stock

ENABLING OBJECTIVES

1. Read a plot plan.
2. Use a builder's level.
3. Read a tape measure.
4. Read a specified order.

RESOURCE

Spence. **General Carpentry**, pp. 134-135.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry**, pp. 134-135.
2. Review setting up builder's level with students.
3. Have students practice marking readings on story pole.
4. Visit a building site where footings, better boards and grade stakes are being established.
5. Have the students establish footing grade using the checklist for evaluation.

PERFORMANCE OBJECTIVE 18

CRITERION-REFERENCED MEASURE

Questions

1. The type of soil and the weight of the building determine the size of the ____________.
2. The footing must be placed below the ____________ line in areas subject to freezing.
3. A recess placed at the center of the footing to provide a strong joint and prevent lateral movement of the wall is called the ____________.

Answers

1. Footing
2. Freeze
3. Key

Practical Application

Given a specified order, the students will establish a footing grade with an accuracy of ± 0.10 feet.

Method of Evaluating Practical Application

Use Checklist Perforance Objective 18 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 18 EVALUATION

ESTABLISHING FOOTING GRADE

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans for finish floor elevation.		
2. Selected stock for story pole.		
3. Set and leveled builder's level.		
4. Took reading of bench mark/elevation reference point.		
5. Marked reading on story pole.		
6. Calculated desired elevation of footing grade from plans.		
7. Marked footing grade on story pole.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY PREPARING BUILDING SITE

PERFORMANCE OBJECTIVE 19

TASK

Locate and square corners

STANDARD OF PERFORMANCE OF TASK

Corners must be located to correspond with specifications on site plan; and diagonal measurements must be equal.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Nails
100 foot tape measure
Plans and specifications
Sledge hammer
Straight stock

ENABLING OBJECTIVES

1. Read a site plan.
2. Read a tape measure.

RESOURCE

Spence. **General Carpentry**, pp. 126-130.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry**, pp. 126-130.
2. Explain how a building is located on a site plan in relation to property lines.
3. Demonstrate how to check the squareness of a rectangular area such as a table by measuring the diagonals.
4. Demonstrate the procedure and then have students lay out a rectangle 10' x 20' on a dirt field using the 6:8:10 method.
5. Have the students locate and square the corner for a building.

PERFORMANCE OBJECTIVE 19

CRITERION-REFERENCED MEASURE

Questions

1. The corners are usually located using a builder's level or a ___________ level.
2. The location of the house on the lot. is shown on the ___________ plan
3. Measurements can be made from an established ___________ line with a steel tape.

Answers

1. Transit
2. Plot
3. Reference

Practical Application

Given the size of a building, the students will locate and square the corners within a tolerance of two inches.

Method of Evaluating Practical Application

Use Checklist Performance Objective 19 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 19 EVALUATION

LOCATING AND SQUARING CORNERS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Established location of proposed construction from plans.		
2. Cut stake(s).		
3. Located main reference point on building site to correspond with plans and specifications.		
4. Set corner stake at reference point (1) with finishing nail in top as corner point.		
5. Determined alignment and distance to next corner and set stake at point 2.		
6. Established line perpendicular to building line.		
7. Measured specified distance between corners.		
8. Checked distance and diagonals against site plan and adjusted when necessary.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY PREPARING BUILDING SITE

PERFORMANCE OBJECTIVE 20

TASK

Install batter boards

STANDARD OF PERFORMANCE OF TASK

Batter boards must locate building corners.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Nails
Plans and specifications
Sledge hammer
Stock for batter boards and stakes

ENABLING OBJECTIVES

1. Use basic carpenter's tools.
2. Read a plot plan.

RESOURCE

Capotosto. **Basic Carpentry,** pp. 124-126.

TEACHING ACTIVITIES

1. Have students read and discuss **Basic Carpentry,** pp. 124-126.
2. Explain and demonstrate the correct method to install stakes to receive batter boards. Have students perform this operation.
3. Demonstrate installing and squaring the building lines. Have students perform this operation.
4. Visit a job site where batter boards are being installed.
5. Have the students install batter boards using the checklist as an evaluation instrument.

PERFORMANCE OBJECTIVE 20

CRITERION-REFERENCED MEASURE

Questions

1. Batter boards are used to locate the ___________ of a building and establish its level.
2. To locate the outside corner of a foundation wall a ___________ line is used.
3. The batterboards should be placed far enough from the building corner to allow room for ___________.

Answers

1. Corners
2. Plumb
3. Excavating

Practical Application

Given the size of a building, the student will install batter boards with a tolerance of 2 inches.

Method of Evaluating Practical Application

Use Checklist Performance Objective 20 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 20 EVALUATION

INSTALLING BATTER BOARDS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Cut stakes.		
2. Cut cross member(s).		
3. Set stakes at first corner, 6 to 10 feet outside building lines.		
4. Set stakes at second corner at an equal distance from building line as for first corner.		
5. Nailed cross members to stakes.		
6. Connected dryline to cross member at second corner.		
7. Extended dryline to stake at first corner and over batter board.		
8. Marked line on batter board using plumb bob.		
9. Drove nail in established line leaving 1/2 inch of nail head exposed.		
10. Attached dryline to exposed nail head.		
11. Repeated steps 3 through 10 to install remaining batter boards.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY PREPARING BUILDING SITE

PERFORMANCE OBJECTIVE 21

TASK

Set grade stakes

STANDARD OF PERFORMANCE OF TASK

Grade stake must be marked with distance noted up or down to specified elevation.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Builder's level
Plans and specifications
Sledge hammer
Stock

ENABLING OBJECTIVES

1. Read tape measure.
2. Use basic carpentry tools.
3. Read elevation plan.

RESOURCE

Spence. **General Carpentry**, pp. 126-127.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry**, pp. 126-127.
2. Explain to students how a grade stake is marked.
3. Have the students practice marking grade stakes.
4. Review the method of finding corners of a building.
5. Have students review setting up the builder's level.
6. Have the students set grade stakes using the performance guide as a task procedure.

PERFORMANCE OBJECTIVE 21

CRITERION-REFERENCED MEASURE

Questions

1. The desired elevation of the soil at each corner is located by the ____________ ____________.
2. The amount of ____________ or ____________ is marked on the grade stake.
3. When sighting longer distances a ____________ rod is used.

Answers

1. Grade stakes
2. Fill, cut
3. Leveling

Practical Application

Have the students set grade stakes correctly at four corners of a building.

Method of Evaluating Practical Application

Use Checklist Performance Objective 21 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 21 EVALUATION

SETTING GRADE STAKES

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Cut stakes.		
2. Determined location of grade stake(s) from plans and specifications.		
3. Set grade stake at highest corner.		
4. Set and leveled builder's level.		
5. Calculated desired elevation at grade stake.		
6. Took reading of bench mark.		
7. Took reading of grade at grade stake and marked pencil line at base of stake.		
8. Marked distance up or down on grade stake at desired elevation.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

SHARPENING TOOLS

DUTY SHARPENING TOOLS

PERFORMANCE OBJECTIVE 22

TASK

Sharpen wood chisel

STANDARD OF PERFORMANCE OF TASK

Wood chisel must be sharp enough to slice through paper; cutting edge must be beveled to a 30° angle; and cutting edge must be without burr.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit

ENABLING OBJECTIVES

1. Use edge tools.
2. Read degrees or angles.

RESOURCE

Feirer. **Cabinetmaking and Millwork**, p. 241.

TEACHING ACTIVITIES

1. Have students read and discuss **Cabinetmaking and Millwork**, p. 241.
2. Lecture on the proper care and sharpening of wood chisels.
3. Explain to students the purpose of medium and fine-grit oilstone.
4. Have students practice holding a chisel at proper angles.
5. Demonstrate honing the blade in a straight line and a figure eight pattern.
6. Have the students sharpen a wood chisel.

PERFORMANCE OBJECTIVE 22

CRITERION-REFERENCED MEASURE

Questions

1. A test for sharpness is to run the edge of a chisel against a piece of ____________.
2. A light coating of ____________ is used on the face of the stone.
3. Edge tools are sharpened on an ____________ ____________.

Answers

1. Paper
2. Oil
3. Oil stone

Practical Application

Have the students sharpen a wood chisel to an accuracy of ± 2°and cutting edge must be without burr.

Method of Evaluating Practical Application

Use Checklist Performance Objective 22 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 22 EVALUATION

SHARPENING WOOD CHISEL

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Lubricated medium-grit oilstone.		
2. Placed bevel edge of chisel flat against medium-grit oilstone.		
3. Applied light pressure with fingers directly over bevel edge of chisel.		
4. Moved chisel in small circles until no shiny spots remain on edge.		
5. Lubricated fine-grit oilstone.		
6. Placed bevel edge of chisel flat against fine-grit oilstone.		
7. Moved chisel in small circles until burr can be detected on flat side of blade.		
8. Stroked flat side of chisel blade lightly along fine oilstone until burr is gone.		
9. Turned chisel over and lightly stroked beveled side until burr has disappeared.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

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DUTY SHARPENING TOOLS

PERFORMANCE OBJECTIVE 23

TASK

Hone plane iron

STANDARD OF PERFORMANCE OF TASK

Cutting edge of plane must be squared with concave bevel of 25° to 30°; cutting edge must be free of burrs and nicks and sharp enough to slice through paper.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Face shield
Plane iron
Power grinder
Try square

ENABLING OBJECTIVES

1. Read degrees or angles.
2. Use square and grinding tool.

RESOURCE

Feirer. **Cabinetmaking and Millwork**, pp. 239-241.

TEACHING ACTIVITIES

1. Have students read and discuss **Cabinetmaking and Millwork**, pp. 239-241.
2. Lecture on the proper care and sharpening of a hone iron.
3. Demonstrate to students how to use a grinding attachment.
4. Have student practice checking size of plane iron with a try square.
5. Have students discuss and demonstrate safety practices with a grinding machine.
6. Explain to students the purpose of medium and fine-grit oilstone.
7. Have the students hone a plane iron.

PERFORMANCE OBJECTIVE 23

CRITERION-REFERENCED MEASURE

Questions

1. Check the square edge of the plane iron with a ________________________.
2. A plane iron blade should be ground to an angle of ____________ to ____________ degrees.
3. After the plane iron has been honed several times, it will lose its ____________

Answers

1. Try square
2. 25, 30
3. Concave

Practical Application

Have students hone plane iron to an accuracy of ± 2° with a cutting edge free of burrs and nicks.

Method of Evaluating Practical Application

Use Checklist Performance Objective 23 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 23 EVALUATION

HONING PLANE IRON

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Set tool rest on grinder to obtain 25° to 30° angle.		
2. Put on face shield.		
3. Turned on grinder.		
4. Rested plane iron blade on tool rest with cutting edge lightly touching moving grinding wheel.		
5. Moved plane iron back and forth across grinding wheel until beveled edge is uniform. (Cooled iron in water occasionally while grinding to prevent drawing temper.)		
6. Removed face shield.		
7. Checked edge for squareness.		
8. Lubricated medium-grit oilstone.		
9. Placed bevel flat against medium-grit oilstone and stroked four or five times.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 23 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
10. Turned plane iron over on flat side and stroked three or four times in same direction.		
11. Lubricated fine-grit oilstone.		
12. Placed bevel flat against fine-grit oilstone and stroked four or five times.		
13. Turned plane iron over on flat side and stroked three or four times in same direction.		

APPROVED: YES _____ NO ____

Evaluator's Signature Date

DUTY SHARPENING TOOLS

PERFORMANCE OBJECTIVE 24

TASK

Sharpen circular saw blade

STANDARD OF PERFORMANCE OF TASK

Degree of set, tooth shape, and filing angles of sharpened saw blade must match paper pattern of specified saw blade. There must be no burrs on sides of teeth; and saw blade must cut without leaving burn marks on lumber.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Emery stone
Filing clamp
Cant file
Oilstone
Saw blade
Saw set
Taper file or mill bastard file

ENABLING OBJECTIVES

1. Read degrees or angles.
2. Match patterns.
3. Use files and stones.

RESOURCE

Feirer. **Cabinetmaking and Millwork**, pp. 251-253.

TEACHING ACTIVITIES:

1. Have students read and discuss **Cabinetmaking and Millwork**, pp. 251-253.
2. Explain to students the meaning of jointing and shaping a blade.
3. Explain to students the difference between hand sharpening and machine sharpening.
4. Show the students the purpose of three basic kinds of blades: rip, crosscut, and combination.
5. Have students practice holding the file on the blade at the proper angle.
6. Demonstrate to students a cut made with a sharp blade and a dull blade, and have students compare the difference.
7. Have the students sharpen a circular saw blade.

PERFORMANCE OBJECTIVE 24

CRITERION-REFERENCED MEASURE

Questions

1. The slot made by a saw when it cuts through a board is called the __________.
2. __________ makes the saw as round as possible so that all teeth are of equal height.
3. Bending the saw teeth to the right and left to provide clearance is called __________.

Answers

1. Kerf
2. Jointing
3. Setting

Practical Application

The students will sharpen a circular saw blade that will match paper pattern, with no burrs on sides of teeth, or burn the wood.

Method of Evaluating Practical Application

Use Checklist Performance Objective 24 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 24 EVALUATION

SHARPENING CIRCULAR SAW BLADE

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked saw blade to determine if jointing and shaping are necessary.		
2. Compared saw blade with paper pattern.		
3. Jointed saw blade as necessary. a. Ran saw blade slowly backward on mandrel by hand. b. Held emery stone lightly against top of teeth as blade moved, until all points of saw blade were the same distance from center.		
4. Compared saw blade with paper pattern.		
5. Placed saw blade in filing clamp.		
6. Shaped teeth as close to original pattern as is possible with gullets of equal depth; used taper file for crosscut and combination saw blades; used mill bastard file for ripsaws.		
7. Marked first tooth to be set.		
8. Placed saw blade in saw set clamp.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 24 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
9. Placed die and anvil of saw set on tooth to be set.		
10. Set this tooth and every other tooth in same direction with same deflection.		
11. Set skipped teeth in opposite direction.		
12. Filed all teeth to sharp points.		
13. Dressed saw blade. a. Lay saw blade on flat surface. b. Ran oilstone lightly over side of teeth until burrs disappeared.		

APPROVED: YES _____ NO ____

Evaluator's Signature　　　　Date

DUTY SHARPENING TOOLS

PERFORMANCE OBJECTIVE 25

TASK

Sharpen twist drill

STANDARD OF PERFORMANCE OF TASK

Bit must have both cutting lips of equal length; cutting lips must form an included angle of 118° with a clearance angle of 12° to 15°.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Grinding wheel
Protractor
Twist drill

ENABLING OBJECTIVES

1. Read angles accurately.
2. Operate grinding wheel.

RESOURCE

Feirer. **Cabinetmaking and Millwork**, p. 259.

TEACHING ACTIVITIES

1. Have students read and discuss **Cabinetmaking and Millwork**, p. 259.
2. Emphasize to students the importance of having a sharp drill bit.
3. Have students discuss and demonstrate safety practices with a grinding machine.
4. Demonstrate to students the proper method of setting up grinder to sharpen bit.
5. Have students use protractor to draw angles of 59° on a sheet of paper.
6. Have the students sharpen a twist drill.

PERFORMANCE OBJECTIVE 25

CRITERION-REFERENCED MEASURE

Questions

1. The best bit to drill small holes is the__________ drill.
2. A correctly sharpened twist drill must have a point angle of _____ degrees on either side.
3. Hold the drill in a __________ position at an angle of 59° to the grinding wheel.

Answers

1. Twist
2. 59°
3. Horizontal

Practical Application

Have students sharpen a twist drill to an accuracy of ± 2°.

Method of Evaluating Practical Application

Use Checklist Performance Objective 25 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 25 EVALUATION

SHARPENING TWIST DRILL

Student's Name **Date**

DIRECTIONS TO STUDENT: Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR: Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Secured a wood block on tool rest of grinder to give 59° angle with wheel edge.		
2. Positioned twist drill against wood block so that cutting lip will be horizontal when it contacts wheel.		
3. Moved bit forward to contact wheel.		
4. Rotated shank and swing bit simultaneously away from wood block about 12° to 15°.		
5. Alternated passes, grinding both lips equally until sharp.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY SHARPENING TOOLS

PERFORMANCE OBJECTIVE 26

TASK

Sharpen auger bit

STANDARD OF PERFORMANCE OF TASK

Cutting lips must be equal in length; angle must be identical to pitch of screw thread; and spur must be sharpened to a 20° to 25° angle.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Auger bit.
Auger bit file.

ENABLING OBJECTIVES

1. Read angles.
2. Use a file.

RESOURCE

Feirer. **Cabinetmaking and Millwork,** pp. 241-242.

TEACHING ACTIVITIES

1. Have students read and discuss **Cabinetmaking and Millwork**, pp. 241-242.
2. Lecture on the proper care and sharpening of an auger bit.
3. Have students practice marking 20° to 25° angles on a piece of paper.
4. Demonstrate to students the correct method of holding file to obtain necessary angle.
5. Have the students sharpen an auger bit.

PERFORMANCE OBJECTIVE 26

CRITERION-REFERENCED MEASURE

Questions

1. An ___________ bit is best used to bore holes 1/4" to 1".
2. Never touch the outside ___________ as this will change the size of the bit.
3. An auger bit is usually turned with a ___________.

Answers

1. Auger
2. Spurs
3. Brace

Practical Application

Have students sharpen auger bit with cutting lips equal in length, angle identical to screw thread, and spur sharpened to a 20° to 25° angle.

Method of Evaluating Practical Application

Use Checklist Performance Objective 26 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 26 EVALUATION

SHARPENING AUGER BIT

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Held shank of bit against solid object.		
2. Filed inside edge of spur with push strokes to obtain 20° to 25° angle.		
3. Turned bit and repeated same number of strokes on other spur.		
4. Turned bit and filed each cutting lip at angle equal to pitch of screw thread.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

BUILDING AND INSTALLING FOUNDATION FORMS

DUTY BUILDING AND INSTALLING FOUNDATION FORMS

PERFORMANCE OBJECTIVE 27

TASK

Construct stud and sheathing wall form

STANDARD OF PERFORMANCE OF TASK

Wall must be plumb and aligned as in plans; nail heads must be flush; and wall form must be structurally able to hold concrete.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Nails
Plans and specifications
Sheathing
Straight stock

ENABLING OBJECTIVES

1. Read and interpret foundation plan.
2. Use basic carpentry tools.

RESOURCE

Spence. **General Carpentry**, pp. 140-143.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry**, pp. 140-143.
2. Explain to students the purpose of a stud and sheathing wall form.
3. Identify the parts of a stud and sheathing wall form.
4. Visit a job site where foundation forms are under construction.
5. Have students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 27

CRITERION-REFERENCED MEASURE

Questions

1. Forms are ___________ so they will release easily from the hardened concrete.
2. A horizontal reinforcement used to keep newly poured concrete forms from bulging outward is called a ___________.
3. "Monolithically" casting a footing and a low wall refers to casting them at the ___________ time.

Answers

1. Oiled
2. Waler
3. Same

Practical Application

Given the tools and material, the students will construct a stud and sheathing wall form.

Method of Evaluating Practical Application

Use Checklist Performance Objective 27 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 27 EVALUATION

CONSTRUCTING STUD AND SHEATHING WALL FORM

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for dimensions.		
2. Calculated size of form needed.		
3. Measured and cut plates and studs for frame.		
4. Nailed frame.		
5. Cut sheathing 1/4 inch larger than frame.		
6. Squared frame.		
7. Nailed sheathing to frame.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY BUILDING AND INSTALLING FOUNDATION FORMS

PERFORMANCE OBJECTIVE 28

TASK

Erect plywood panel wall form

STANDARD OF PERFORMANCE OF TASK

Wall must be secure, plumb, and aligned as specified in plans; and wall form must be structurally able to hold concrete. Nailheads must be flush to panel.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Nails
Plywood panels
Plans and specifications
Power saw
Snapties
Stiffbacks
Straight stock
Walers

ENABLING OBJECTIVES

1. Read and interpret foundation plan.
2. Use basic carpentry tools.

RESOURCE

Spence. **General Carpentry**, pp. 142-147.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry**, pp. 142-147.
2. Visit a job site where foundation wall forms are being erected. Have students discuss what they have observed.
3. Review with students the methods of using a plumb bob and chalk line.
4. Explain to students the proper method of bracing forms.
5. Have students practice erecting a section of wall form by using a level.
6. Have students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 28

CRITERION-REFERENCED MEASURE

Questions

1. The outside face of the foundation line is marked with a ____________ ____________.
2. An ____________ ____________ is used to hold the form in place as it is assembled.
3. The vertical of the wall is checked with a ____________.

Answers

1. Chalk line
2. Adjustable brace
3. Level

Practical Application

Given a plywood panel wall form, the students will erect the wall, plumb and align as specified in plans.

Method of Evaluating Practical Application

Use Checklist Performance Objective 28 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 28 EVALUATION

ERECTING PLYWOOD PANEL WALL FORM

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for dimensions.		
2. Measured and cut panels and plates (top, bottom and center plates) for all panel assemblies.		
3. Nailed plates to panels.		
4. Laid out and struck chalk line on footer for wall line.		
5. Nailed first panel assembly through bottom plate to line on footer.		
6. Leveled panel.		
7. Installed temporary brace.		
8. Aligned and nailed second panel assembly with first panel assembly.		
9. Continued first row of panels to length designated on plans.		
10. Installed snapties as specified.		
11. Placed second row of panels staggering vertical joints.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 28 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
12. Continued rows of panels until desired height has been achieved.		
13. Repeated steps 4 through 12 to install panel assemblies on opposite side of footer.		
14. Nailed walers on snapties.		
15. Nailed bulkheads as necessary.		
16. Braced and aligned form.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY BUILDING AND INSTALLING FOUNDATION FORMS

PERFORMANCE OBJECTIVE 29

TASK

Erect manufactured wall form

STANDARD OF PERFORMANCE OF TASK

Manufactured wall form must be secure, plumb, set at specified position and elevation, and structurally able to hold concrete.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Builder's level
Manufacturer's instructions
Walers
Manufactured wall form and accessories
Plans and specifications

ENABLING OBJECTIVES

1. Read and interpret foundation plan.
2. Use basic carpentry tools.

RESOURCE

Spence. **General Carpentry**, pp. 145-147.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry**, pp. 145-147.
2. Visit a job site where foundation wall forms are being erected.
3. Have students practice erecting and using a level to plumb a section of wall form.
4. Explain to students the proper way to use wall ties and securing wall with walers.
5. Have students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 29

CRITERION-REFERENCED MEASURE

Questions

1. To strengthen a long wall a ____________ is used.
2. ____________ is widely used for form sheathing for it has many advantages over the use of boards.
3. The use of prefabricated panels requires ____________.

Answers

1. Pilaster
2. Plywood
3. Labor

Practical Application

Given a manufactured wall form, the students will erect it securely, plumb and set at specified position and able to hold concrete.

Method of Evaluating Practical Application

Use Checklist Performance Objective 29 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 29 EVALUATION

ERECTING A MANUFACTURED WALL FORM

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Determined size and location of intended form from plans.		
2. Laid out and struck chalk line on footer for wall line.		
3. Selected lengths and shapes of specified manufactured wall form.		
4. Set manufactured wall form in place.		
5. Nailed wall form to line on footer through bottom plate.		
6. Plumbed and braced.		
7. Attached wall ties as per manufacturer's instructions.		
8. Layed out and struck chalk line on footer for line for opposite side of form.		
9. Repeated items 3 through 7 for wall forms on opposite side of footer.		
10. Established and marked elevation.		
11. Adjusted as necessary.		
12. Secured wall with walers and bracing according to manufacturer's instructions.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY BUILDING AND INSTALLING FOUNDATION FORMS

PERFORMANCE OBJECTIVE 30

TASK

Construct stair form

STANDARD OF PERFORMANCE OF TASK

Stair form must be secure, plumb and aligned as specified in plans; and stair form must be structurally able to hold concrete.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Nails
Plans and specifications
Plywood
Sheathing
Sledge hammer
Straight stock

ENABLING OBJECTIVES

1. Read and interpret stair detail.
2. Use basic carpentry tools.

RESOURCE

Spence. **General Carpentry**, p. 152

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry,** p. 152.
2. Review with students how to calculate the run and rise of a set of steps.
3. Have students explain how to mark off a stair stringer.
4. Review the purposes and methods of proper bracing.
5. Explain to students how to anchor concrete stairs to the main structure.
6. Discuss with students the proper size material to use in building the stair form.
7. Have the students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 30

CRITERION-REFERENCED MEASURE

Questions

1. The bottom edge of the riser is ____________ to enable the mason's trowel to reach the inside corner of the step.
2. The member that holds the concrete at the front of the step is called the ____________ board.
3. ____________ are expected to build the forms for stairs, sidewalks and drives.

Answers

1. Beveled
2. Riser
3. Carpenters

Practical Application

Given the proper material the students will construct a stair form that is secure, plumb, and aligned as specified according to plan.

Method of Evaluating Practical Application

Use Checklist Performance Objective 30 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 30 EVALUATION

CONSTRUCTING STAIR FORMS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications for stair detail.		
2. Calculated rise and run of form.		
3. Calculated number of risers, unit rise, and unit run.		
4. Selected stock.		
5. Laid out and cut stair stringers.		
6. Secured stringer in position with supports.		
7. Installed sheathing or plywood on underside of stringer as necessary.		
8. Secured form with supports and braces.		
9. Measured and cut risers to width and length.		
10. Beveled bottom edge of risers.		
11. Installed risers.		
12. Braced risers as necessary.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY BUILDING AND INSTALLING FOUNDATION FORMS

PERFORMANCE OBJECTIVE 31

TASK

Construct box for specified opening

STANDARD OF PERFORMANCE OF TASK

Box must be built to specification, aligned, and easily removable.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret foundation plan.
2. Use basic carpentry tools.

RESOURCE

Spence. **General Carpentry**, pp. 148-150.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry**, pp. 148-150.
2. Have students practice measuring specified openings.
3. Discuss with students the proper size material to construct box.
4. Have the students estimate the amount of material to build a box from an assigned size.
5. Show the students how to cut a saw kerf or notch in the side for easy removal.
6. Have the students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 31

CRITERION-REFERENCED MEASURE

Questions

1. The concrete above an opening must be ___________.
2. To make it easy to remove the form, a ___________ is cut in the sides.
3. If the form is poorly braced, the weight of the concrete will cause it to ___________.

Answers

1. Reinforced
2. Notch
3. Sag

Practical Application

Given the material, the students will construct a box for a specified opening.

Method of Evaluating Practical Application

Use Checklist Performance Objective 31 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 31 EVALUATION

CONSTRUCTING BOX FOR SPECIFIED OPENING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Determined dimensions and location of rough opening from plans.		
2. Selected and cut stock to length.		
3. Nailed framing members together.		
4. Laid out and installed box at specified location.		
5. Leveled, plumbed and adjusted as necessary.		
6. Secured and braced.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY BUILDING AND INSTALLING FOUNDATION FORMS

PERFORMANCE OBJECTIVE 32

TASK

Construct footing form

STANDARD OF PERFORMANCE OF TASK

Form must be of specified thickness and width; top edge must be level with grade stake; ad form must be structurally able to hold concrete.

SOURCE OF STANDARD

Modern Carpentry, p. 91.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Builder's level
Circular saw
Mattock
Nails
Pick
Plans and specifications
Shovel
Sledge hammer

ENABLING OBJECTIVES

1. Read and interpret foundation plan.
2. Use basic carpentry tools.

RESOURCE

Spence. **General Carpentry,** pp. 133-140.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry**, pp. 133-140.
2. Visit a worksite with students where a footing form is being constructed.
3. Review with students how the position of the grade stakes was determined.
4. Explain to students the correct thickness of material used to build forms.
5. Discuss with the students a variety of ties to hold the forms together.
6. Explain to students how the type of soil and weight of the building could influence the size of the footing.
7. Have the students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 32

CRITERION-REFERENCED MEASURE

Questions

1. A concrete pad placed on the soil is called the ___________ .
2. The foundation is tied to the footing by a ___________ .
3. Footings may be ___________ up a slope to save labor and materials.

Answers

1. Footing
2. Keyway
3. Stepped

Practical Application

Have the students construct a footing form of specified thickness and width; top edge level with grade stake; and structurally able to hold concrete.

Method of Evaluating Practical Application

Use Checklist Performance Objective 32 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 32 EVALUATION

CONSTRUCTING FOOTING FORMS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	**Unsatisfactory**
1. Determined size of footing from plans.		
2. Set stock along perimeter of proposed footing and cut to length.		
3. Set stakes on established footing line to specified elevation.		
4. Nailed side panels to stakes at specified elevation.		
5. Checked form for level and elevation and adjusted as necessary.		
6. Set stock for opposite side of footing form and cut to length.		
7. Set second set of stakes on opposite footing line.		
8. Nailed side panels to stakes at specified elevation.		
9. Checked level and elevation and adjusted as necessary.		
10. Cut furring for spreaders to width of form.		
11. Aligned and secured.		
12. Shoveled dirt around outside of form.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY BUILDING AND INSTALLING FOUNDATION FORMS

PERFORMANCE OBJECTIVE 33

TASK

Strip form

STANDARD OF PERFORMANCE OF TASK

Form must be pulled away from concrete without putting lateral pressure on wall; wall must be free of nails and excess concrete.

SOURCE OF STANDARD

Residential Carpentry, p. 106.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Pick
Rustproofer
Shovel
Snaptie wrench
Wire brush

ENABLING OBJECTIVES

1. Use basic carpentry tools.
2. Use pick and shovel.

RESOURCE

Spence. **General Carpentry,** p. 136.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry,** p. 136.
2. Demonstrate to students how to break away excessive concrete without damaging footing.
3. Show students proper safety in handling picks and wrenches.
4. Explain to students the necessity of brushing oil on cleaned forms and rust proofing metal parts.
5. Have the students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 33

CRITERION-REFERENCED MEASURE

Questions

1. After the concrete is hard, the ___________ boards are removed.
2. Dirt is best moved away from the forms with a ___________.
3. To preserve the form, a parting agent may be used instead of ___________.

Answers

1. Form
2. Shovel
3. Oil

Practical Application

Have the students pull form away from concrete without putting lateral pressure on wall. The wall must be free of nails and excess concrete.

Method of Evaluating Practical Application

Use Checklist Performance Objective 33 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 33 EVALUATION

STRIPPING FORM

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Chipped away concrete which has overflowed form.		
2. Shoveled dirt away from forms.		
3. Removed and stored braces and stakes.		
4. Removed batten strips.		
5. Removed tie cleats and walers.		
6. Drove pick underneath end of form.		
7. Pried up form. All forms must be stripped working from center to corners.		
8. Removed nails and connectors from boards.		
9. Cleaned concrete from boards.		
10. Brushed oil on cleaned forms.		
11. Stored forms.		
12. Removed exposed portions of wall ties.		
13. Brushed and rustproofed reusable metal parts.		
14. Stored metal parts.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

PERFORMANCE OBJECTIVE 34

TASK

Install beam

STANDARD OF PERFORMANCE OF TASK

Beam must be level, secure, and at specified position and elevation; and beam must be secured as specified on plans.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Beam
Builder's level
Fasteners
Plans and specifications
Shim stock

ENABLING OBJECTIVES

1. Read and interpret blue print.
2. Use basic carpentry tools.

RESOURCE

Spence. **General Carpentry**, pp. 169-174.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry**, pp. 169-174.
2. Discuss with students the various types of beams, solid, built-up, laminated and box.
3. Explain to students the weight requirements of beams.
4. Show students the clearance requirements if a pocket is prepared in the foundation wall.
5. Show students the various ways to anchor the beam to the foundation or piers.
6. Show the students which way to turn the crown on the beam if necessary.
7. Have the students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 34

CRITERION-REFERENCED MEASURE

Questions

1. The concrete pocket should be lined with sheet metal to protect the beam from ____________.
2. A large pole of wood or metal used to support a load over a long distance is called a ____________ .
3. The ends of the wood girder must rest at least ____________ inches on the foundation wall.

Answers

1. Termites
2. Beam
3. Four

Practical Application

The students will install a beam that is level, secure and within 1/8 inches of specified position.

Method of Evaluating Practical Application

Use Checklist Performance Objective 34 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 34 EVALUATION

INSTALLING A BEAM

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans for beam location and specifications.		
2. Checked elevations of walls and/or piers intended to support beam.		
3. Raised beam into position.		
4. Secured beam.		
5. Checked for level and adjusted as necessary.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

PERFORMANCE OBJECTIVE 35

TASK

Install anchor bolt in concrete

STANDARD OF PERFORMANCE OF TASK

Anchor bolt must be secure in concrete and set according to plans with specified exposure.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Anchor bolt
Stock

ENABLING OBJECTIVES

1. Read and interpret a blue print.
2. Use standard tools.

RESOURCE

Spence. **General Carpentry**, pp. 166-168.

TEACHING ACTIVITIES

1. Have the students read and discuss **General Carpentry**, pp. 166-168.
2. Show the students the correct length anchor bolts for using in concrete.
3. Explain to students the purpose of an anchor bolt.
4. Show the students several styles of anchor bolts.
5. Explain to students the advantages of having a template.
6. Have the students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 35

CRITERION-REFERENCED MEASURE

Questions

1. To locate anchor bolt holes in the sill plate a ____________ is most often used.
2. The most common anchor is the ____________ shaped anchor.
3. Anchor bolts are set in place after the ____________ is poured.

Answers

1. Square
2. L
3. Concrete

Practical Application

Have the students install an anchor bolt in concrete and set within ± 1/4 inch of specified location.

Method of Evaluating Practical Application

Use Checklist-Performance Objective 35 to determine if the assignment was completed with at least 100 percent accuracy.

CHECKLIST FOR PERFORMANCE OBJECTIVE 35 EVALUATION

INSTALLING ANCHOR BOLT IN CONCRETE

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Determined location, spacing, and size of anchor bolts from plans.		
2. Constructed and set template to specified location and elevation.		
3. Installed anchor bolts in template and adjusted to specified elevation.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY BUILDING AND INSTALLING FOUNDATION FORMS

PERFORMANCE OBJECTIVE 36

TASK

Install anchor bolt in concrete block

STANDARD OF PERFORMANCE OF TASK

Anchor bolt must be secure in concrete block with specified exposure.

SOURCE OF STANDARD

Modern Carpentry, p. 101.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Anchor bolt
Concrete block
Fill material
Mortar
Plans and specifications

ENABLING OBJECTIVES

1. Read and interpret blue print.
2. Use standard tools.

RESOURCE

Spence. **General Carpentry**, pp. 166-168.

TEACHING ACTIVITIES

1. Have the students read and discuss **General Carpentry**, pp. 166-168.
2. Show students the type of material that can be placed in concrete block to hold mortar.
3. Demonstrate to students how the desired exposure is determined.
4. Show the students the correct length anchor bolts for concrete block.
5. Have students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 36

CRITERION-REFERENCED MEASURE

Questions

1. Concrete block foundations require the cavity holding the anchor bolt to be filled with ____________.
2. Under no condition should you ____________ the anchor bolt nuts.
3. A ____________ is placed under the cavities to be filled with concrete.

Answers

1. Concrete
2. Overtighten
3. Screen

Practical Application

Have the students install an anchor bolt in concrete block that is secure and within ± 1/4 inch of specified location.

Method of Evaluating Practical Application

Use Checklist Performance Objective 36 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 36 EVALUATION

INSTALLING ANCHOR BOLT IN CONCRETE BLOCK

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Determined location of anchor bolts from plans.		
2. Stuffed fill material into void of concrete block.		
3. Filled remainder of void with mortar.		
4. Pushed anchor bolt into wet mortar.		
5. Adjusted height of bolt to desired exposure.		
6. Checked bolt for plumb.		
7. Tamped and smoothed mortar around bolt.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY BUILDING AND INSTALLING FOUNDATION FORMS

PERFORMANCE OBJECTIVE 37

TASK

Install bulkhead

STANDARD OF PERFORMANCE OF TASK

Bulkhead must support footer concrete and must connect upper and lower footer forms; finish bulkhead height must be ± 0.10 feet of required footer height or within permissible tolerance of specified order and class of job.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Builder's level
Circular saw
Nails
Plans and specifications
Stock

ENABLING OBJECTIVES

1. Read and interpret a foundation plan.
2. Use standard tool kit.

RESOURCE

Capotosto. **Basic Carpentry**, pp. 132-133.

TEACHING ACTIVITIES

1. Have students read and discuss **Basic Carpentry**, pp. 132-133.
2. Explain to students why the bulkhead should be built so the concrete will be cast in one piece.
3. Visit a job site where bulkheads are being installed on the footings.
4. Discuss with students the proper size material used to build bulkheads and braces.
5. Review with students how to use a builder's level and plumb.
6. Have students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 37

CRITERION-REFERENCED MEASURE

Questions

1. A bulkhead must be built when it is necessary to have a ____________ in the footer.
2. The bulkhead must ____________ the upper and lower footer forms.
3. The footing should be cast in one ____________.

Answers

1. Stop
2. Connect
3. Piece

Practical Application

Have the students install a bulkhead that supports footer concrete and connects upper and lower footer forms. Finish bulkhead must be within ± 0.10 feet of required height.

Method of Evaluating Practical Application

Use Checklist Performance Objective 37 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 37 EVALUATION

INSTALLING BULKHEAD

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Determined location of bulkhead from plans.		
2. Measured height, width and vertical dimensions of required bulkhead.		
3. Selected and cut stock to length.		
4. Assembled bulkhead.		
5. Set bulkhead in place connecting forms.		
6. Plumbed bulkhead.		
7. Braced behind bulkhead as necessary.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY BUILDING AND INSTALLING FOUNDATION FORMS

PERFORMANCE OBJECTIVE 38

TASK

Install expansion and contraction joint in concrete slab

STANDARD OF PERFORMANCE OF TASK

Expansion and contraction joint must be straight and must be as specified on plans.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Expansion and contraction joint
Slab forms

ENABLING OBJECTIVES

1. Read and interpret a foundation plan.
2. Use standard masonry tools.
3. Identify proper protective clothing.

RESOURCE

Spence. **General Carpentry**, pp. 154-156.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry**, pp. 154-156.
2. Visit a job site where floor slab is being poured and expansion joints are being installed.
3. Show students how to measure and cut joint material.
4. Explain to students the meaning of pouring the footing and slab monolithically.
5. Demonstrate the proper method of finding and marking the floor elevation for pouring concrete.
6. Have students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 38

CRITERION-REFERENCED MEASURE

Questions

1. Expansion and contraction joints prevent the slab from ____________.
2. Shrinkage of concrete during hydration can depend on the ____________ of the mix.
3. The structural ____________ will determine the best place for the joints.

Answers

1. Cracking
2. Richness
3. Engineer

Practical Application

Have the students install an expansion and contraction joint in a concrete slab within ± 1/4 inch of specified plans.

Method of Evaluating Practical Application

Use Checklist Performance Objective 38 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 38 EVALUATION

INSTALLING EXPANSION AND CONTRACTION JOINT IN CONCRETE SLAB

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Established elevation of floor slab and location of expansion/contraction joint.		
2. Snapped chalk line at established floor elevation.		
3. Installed expansion/contraction joints around inside perimeter of form and at other specified locations, butting joints.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY BUILDING AND INSTALLING FOUNDATION FORMS

PERFORMANCE OBJECTIVE 39

TASK

Install expansion and contraction joint in concrete wall

STANDARD OF PERFORMANCE OF TASK

Expansion and contraction joint must be straight and placed as specified on plans.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Expansion/contraction joint
Plans and specifications
Stock

ENABLING OBJECTIVES

1. Read and interpret a foundation plan.
2. Read a tape measure.

RESOURCE

Waddell. **Concrete Construction Handbook**, p. 28.

TEACHING ACTIVITIES

1. Have students read and discuss **Concrete Construction Handbook**, p. 28.
2. Visit a job site where expansion or contraction joints are being installed and discuss job with students.
3. Explain to students the purpose of joints.
4. Explain the similarity between vertical and horizontal joints.
5. Discuss with students the changes caused by moisture and temperature.
6. Show students various types of material used to build joints.
7. Explain to students the method of sawing a joint after the concrete is hard.
8. Have the students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 39

CRITERION-REFERENCED MEASURE

Questions

1. Contraction joints are placed where shrinkage of concrete would cause a __________.
2. Tongue-and-groove shear keys are sometimes cast in __________ construction joints.
3. A dummy or weakened plane joint is made by __________ the slab while the concrete is still plastic.

Answers

1. Crack
2. Vertical
3. Scoring

Practical Application

Have the students install an expansion and contraction joint in a concrete wall that is straight and placed as specified on plans.

Method of Evaluating Practical Application

Use Checklist Performance Objective 39 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 39 EVALUATION

INSTALLING EXPANSION AND CONTRACTION JOINT IN CONCRETE WALL

Student's Name **Date**

DIRECTIONS TO STUDENT	Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.
DIRECTIONS TO EVALUATOR	Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Determined location of expansion/contraction joint from plans.		
2. Set stop board along intended location of expansion/contraction joint.		
3. Braced stopboard from behind.		
4. Poured concrete up to stopboard.		
5. Allowed concrete to set.		
6. Removed stopboard.		
7. Set expansion/contraction joint in position against concrete.		
8. Poured remaining area of concrete up to expansion/contraction joint.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY BUILDING AND INSTALLING FOUNDATION FORMS

PERFORMANCE OBJECTIVE 40

TASK

Install keyway for footing and foundation

STANDARD OF PERFORMANCE OF TASK

Keyway must be size and location as determined from specifications.

SOURCE OF STANDARD

Residential Carpentry, p. 53.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Concrete
Framed-in footing form
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret footing and foundation plans.
2. Use standard tool kit.

RESOURCE

Spence. **General Carpentry**, pp. 134-136.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry**, pp. 134-136.
2. Explain to students why the keyway should be tapered.
3. Have students practice marking the centers of various width boards.
4. Show students how to properly lift the keyway from the concrete.
5. Explain to students why the keyway should be oiled.
6. Have the students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 40

CRITERION-REFERENCED MEASURE

Questions

1. A keyway is used to tie the ____________ wall to the footing.
2. The member for the keyway should be ____________ for easy removal.
3. The keyway prevents ____________ movement of the foundation wall.

Answers

1. Foundation
2. Beveled
3. Lateral

Practical Application

Have students install keyway for footing and foundation that is of correct size and within ± 1/8 inch of center.

Method of Evaluating Practical Application

Use Checklist Performance Objective 40 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 40 EVALUATION

INSTALLING KEYWAY FOR FOOTING AND FOUNDATION

Student's Name **Date**

DIRECTIONS TO STUDENT — Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR — Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Determined size of keyway from specifications.		
2. Cut stock to size and shape of specified keyway.		
3. Marked center of keyway on footing.		
4. Marked center of keyway on keyway.		
5. Screed concrete.		
6. Aligned center marks on footing and keyway concrete.		
7. Pressed key form into concrete and rescreed.		
8. Lifted keyway from green concrete after keyway is formed.		
9. Continued forming keyway around entire footing.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY BUILDING AND INSTALLING FOUNDATION FORMS

PERFORMANCE OBJECTIVE 41

TASK

Screed concrete

STANDARD OF PERFORMANCE OF TASK

Screeding must be flat with no holes in finished concrete.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Concrete
Straight stock

ENABLING OBJECTIVES

1. Use standard masonry tools.
2. Follow directions.

RESOURCE

Spence. **General Carpentry**, p. 154.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry**, p. 154.
2. Visit a job site and observe screeding a slab. Have students discuss what they are observing.
3. Explain to students why the concrete should overfill the forms before screeding.
4. Show students how to fill holes in concrete.
5. Explain to students why the screed is pulled with a back and forth motion.
6. Have the students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 41

CRITERION-REFERENCED MEASURE

Questions

1. The purpose of screeding the concrete is to ____________ it.
2. The screed is pulled from side to side on the ____________ boards.
3. After the concrete is screeded, the surface can be ____________ to a smooth surface.

Answers

1. Level
2. Form
3. Troweled

Practical Application

Have the students screed concrete so that it is flat and with no holes in the finished surface.

Method of Evaluating Practical Application

Use Checklist Performance Objective 41 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 41 EVALUATION

SCREEDING CONCRETE

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Selected straight stock.		
2. Cut stock to width of forms plus 24 inches.		
3. Set length on edge across top of forms at one end.		
4. Pounded concrete into forms.		
5. Dragged screed along forms with back and forth motion.		
6. Filled holes which may develop with excess concrete.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY BUILDING AND INSTALLING FOUNDATION FORMS

PERFORMANCE OBJECTIVE 42

TASK

Waterproof concrete block wall

STANDARD OF PERFORMANCE OF TASK

Two coats of cement plaster must extend from footing to approximately 6 inches above finished grade.

SOURCE OF STANDARD

Modern Carpentry, p. 103.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Cement plaster
Trowel
Water and sprayer

ENABLING OBJECTIVES

1. Use standard masonry tools.
2. Follow directions.

RESOURCE

Feirer. **Carpentry and Building Construction**, p. 248.

TEACHING ACTIVITIES

1. Have students read and discuss **Carpentry and Building Construction**, p. 248.
2. Explain to students the purpose of plastering a block wall.
3. Demonstrate the proper method of using the masonry trowel to spread plaster.
4. Explain the purpose of forming a cove where the wall joins the footing.
5. Explain to students why the workability or plasticity of the mortar is important.
6. Have the students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 42

CRITERION-REFERENCED MEASURE

Questions

1. When the mortar is dry, a coating of ____________ will normally insure a dry basement.
2. Waterproofing a concrete wall is done to prevent ____________.
3. To waterproof a concrete block wall, you need to use good ____________.

Answers

1. Asphalt
2. Leakage
3. Mortar

Practical Application

Have students water proof a concrete block wall with two coats of cement plaster with minimum leakage.

Method of Evaluating Practical Application

Use Checklist Performance Objective 42 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 42 EVALUATION

WATERPROOFING CONCRETE BLOCK WALL

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Dampened wall surface with water spray.		
2. Applied first coat of cement plaster.		
3. Allowed first coat to partially harden for at least 24 hours.		
4. Roughened first coat to provide better bond for second coat.		
5. Dampened wall surface.		
6. Applied second coat of cement plaster.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

INSTALLING ROUGH FRAMING

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 43

TASK

Stack lumber

STANDARD OF PERFORMANCE OF TASK

Lumber must be stacked off the ground and must be completely covered. Lumber must be neatly stacked in order of usage.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Even site
Stock
Tarpaulins

ENABLING OBJECTIVES

1. Identify lumber by size and type.
2. Identify proper protective clothing.

RESOURCE

Spence. **General Carpentry**, pp. 100-101.

TEACHING ACTIVITIES

1. Have students read and discuss **General Carpentry**, pp. 100-101.
2. Demonstrate to students how to place strips of wood between layers.
3. Explain to students how circulation of air between layers (of stacked wood) helps the drying process.
4. Explain why stacks of lumber should be covered.
5. Discuss with students how lumber shrinks as it dries.
6. Discuss with students why lumber should be stacked as straight as possible.
7. Have students complete the performance of the task on the checklist.

PERFORMANCE OBJECTIVE 43

CRITERION-REFERENCED MEASURE

Questions

1. Lumber should be ___________ with a tarpaulin to protect it from the weather.
2. Each ___________ of lumber should be separated with strips of wood.
3. Lumber should be stacked off the ___________ and on an even site.

Answers

1. Covered
2. Layer
3. Ground

Practical Application

Have the students stack lumber off the ground, neatly and in order of usage.

Method of Evaluating Practical Application

Use Checklist Performance Objective 43 to determine if the assignment was completed with 100 percent accuracy.

CHECKLIST FOR PERFORMANCE OBJECTIVE 43 EVALUATION

STACKING LUMBER

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Placed scraps of stock evenly on ground to keep lumber off ground.		
2. Stacked boards in reverse order of usage with stock to be used first on top of stack.		
3. Covered all stock with tarpaulins to protect from weather.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 44

TASK

Construct single-pole scaffold

STANDARD OF PERFORMANCE OF TASK

Scaffolds more than 4 feet but less than 10 feet high must have floor of at least 45 inches width or guardrails on open sides and ends. Higher than 10 feet must have guardrails; outer edge of platform must be far enough away from building to permit working at roof overhang. Poles must be made of clear straight-grain 2 x 4 stock. Planks must be of a grade high enough to withstand bending loads; ends of planks must extend at least 6 inches beyond center of support and overlap other planks at least 12 inches. Ledgers must be at least 4 feet long and made of 2 x 6 stock nailed level ± 2°; and scaffold must be securely fastened.

SOURCE OF STANDARD

Residential Carpentry, pp. 197, and 199-200.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Exterior wall
Nails
Straight stock

ENABLING OBJECTIVES

1. Identify and use a standard tool kit.
2. Measure accurately.
3. Identify lumber in terms of type and useability.

RESOURCE

Wagner. **Modern Carpentry**, pp. 543-549.

TEACHING ACTIVITIES

1. Have the students read and discuss **Modern Carpentry**, Unit 24, pp. 543-549.
2. Lay out and demonstrate the steps of the task.
3. Explain the necessity of using straight grain lumber.
4. Draw a single pole scaffold on black board.
5. Lecture on sizes and length of lumber.
6. Explain how framing lumber is sold.

PERFORMANCE OBJECTIVE 44

CRITERION-REFERENCED MEASURE

Questions

1. Scaffolds less than 10 feet high must have a floor of at least ________ inches width.
2. Poles must be made of clear strength grain ________ x ________ stock.
3. Ledgers must be at least ________ feet long and made of ________ x ________ stock.

Answers

1. 45"
2. 2 x 4
3. 4' - 2 x 6

Practical Application

Have the students construct a single pole scaffold to meet standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 44 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 44 EVALUATION

CONSTRUCTING A SINGLE-POLE SCAFFOLD

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Determined height and width of working platform required.		
2. Calculated length of and number of blocks and ledgers.		
3. Measured and cut blocks.		
4. Measured and cut ledgers.		
5. Selected poles.		
6. Nailed blocks to exterior wall studs.		
7. Nailed ledgers to poles.		
8. Raised poles into position and toenailed ledgers onto tops of blocks.		
9. Placed poles on blocks to prevent settling.		
10. Measured and cut braces to required length.		
11. Nailed braces across poles in "X" fashion.		
12. Selected planks to span ledgers.		
13. Lifted planks into place overlapping at supports as necessary.		
14. Nailed guardrail and toeboard across open side and ends.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 45

TASK

Construct double-pole scaffold

STANDARD OF PERFORMANCE OF TASK

Scaffolds more than 4 feet but less than 10 feet high must have floor of at least 45 inches width or guardrails on open sides and ends. Higher than 10 feet must have guardrails; outer edge of platform must be far enough away from building to permit working at roof overhang. Poles must be made of clear straight grain 2 x 4 stock. Planks must be made of grade high enough to withstand bending loads; ends of planks must extend at least 6 inches beyond center of support and overlap other planks at least 12 inches. Ledgers must be at least 4 feet long and made of 2 x 6 stock nailed level ± 2°; and scaffold must be braced with 1 x 6 stock and securely fastened together.

SOURCE OF STANDARD

Residential Carpentry, pp. 196-197, 199-200.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Nails
Straight stock.

ENABLING OBJECTIVES

1. Identify and use standard tool kit.
2. Measure accurately.
3. Identify lumber in terms of type and useability.

RESOURCE

Wagner. **Modern Carpentry,** pp. 543-549.

TEACHING ACTIVITIES

1. Have the students read and discuss **Modern Carpentry**, Unit 24, pp. 543-549.
2. Layout and demonstrate the steps of the task.
3. Explain the need for using straight grain lumber.
4. Draw a double-pole scaffold on blackboard.
5. Explain how lumber is sold (sizes and lengths).

PERFORMANCE OBJECTIVE 45

CRITERION-REFERENCED MEASURE

Questions

1. A pole scaffold higher than 10 feet must have ___________.
2. Planks must extend at least ___________ inches beyond center of support.
3. Scaffold must be braced with _______ x _______ stock.

Answers

1. Guardrails
2. 6 inches
3. 1" x 6"

Practical Application

Have the students construct a double pole scaffold to meet standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 45 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 45 EVALUATION

CONSTRUCTING A DOUBLE POLE SCAFFOLD

Student's Name **Date**

DIRECTIONS TO STUDENT — Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR — Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Determined height and width of working platform required.		
2. Calculated length of and number of blocks and ledgers.		
3. Measured and cut blocks.		
4. Measured and cut ledgers.		
5. Selected poles.		
6. Nailed ledgers to poles.		
7. Measured and cut horizontal bracing.		
8. Nailed horizontal bracing to bottoms of two poles.		
9. Nailed "X" bracing across this assembly.		
10. Measured and cut blocks and ledgers for remaining poles.		
11. Raised both assemblies to vertical position.		
12. Nailed assemblies together with horizontal bracing on top and bottom of both sides.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 45 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
13. Nailed one diagonal brace on each side.		
14. Selected planks to span upper ledgers.		
15. Lifted planks into place and overlapped at supports as necessary.		
16. Nailed guardrails and toeboards on at least two sides.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 46

TASK

Install sill plate

STANDARD OF PERFORMANCE OF TASK

Sill plate must be level; sill members must be protected against moisture. Plate and wall seam must be airtight; corners must be square and diagonals must be equal from corner to corner. Size and spacing of anchor bolts must conform to specifications.

SOURCE OF STANDARD

Modern Carpentry, p. 119.
Residential Carpentry, p. 124.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Building foundation
Flat washers and nuts
Moisture seal
Plans and specifications
Straight stock.

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Use standard tool kit.
3. Recognize and identify straight stock.

RESOURCE

Wagner. **Modern Carpentry**, pp. 149-171.

TEACHING ACTIVITIES

1. Have the students read and discuss **Modern Carpentry**, pp. 149-171.
2. Discuss the types of sills.
3. Lecture on lumber: random lengths, board foot.
4. Explain the sizes of framing, from nominal size to finished size.
5. Demonstrate the steps of the task.

PERFORMANCE OBJECTIVE 46

CRITERION-REFERENCED MEASURE

Questions

1. Name two types of sill anchors.
2. Sills are set back on foundation the thickness of the __________ sheathing.
3. Sizes and spacing of anchors must conform to __________.
4. Sills must be straight and level low spots can be __________ with wedges and __________ with mortor or cement.

Answers

1. Bolt strap
2. Wall
3. Specifications
4. Shimmed - grouted

Practical Application

Have students construct a sill, with plate attached, to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 46 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 46 EVALUATION

INSTALLING A SILL PLATE

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for size and setback of sill plate.		
2. Marked setback with chalk line.		
3. Measured and cut first length of plate, using single piece if possible.		
4. Cut any additional plate lengths with all ends square.		
5. Placed plate(s) upright along chalk line and marked position of anchor bolts.		
6. Drilled holes for each bolt.		
7. Set plate(s) over anchor bolt.		
8. Checked for fit and adjusted if necessary.		
9. Removed plate(s) and installed moisture seal.		
10. Replaced and secured plate in place with washers and nuts.		
11. Continued to set plate over anchor bolts for remaining perimeter of foundation.		
12. Returned to starting point to install second layer of plates for built-up sill, staggering joints.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 47

TASK

Free wall

STANDARD OF PERFORMANCE OF TASK

Wall must be plumb and straight; studs and wall openings must be spaced according to specifications. Headers and plates must be as specified on plans.

SOURCE OF STANDARD

Modern Carpentry, p. 135.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Identify and select straight stock.
2. Recognize plans and layout accordingly.
3. Measure accurately.

RESOURCE

Wagner. **Modern Carpentry**, pp. 173-193.

TEACHING ACTIVITIES

1. Have the student read **Modern Carpentry**, pp. 173-193.
2. Have students discuss the spacing of studs.
3. Explain the term "system."
4. Have the students identify the names of parts for a typical wall.
5. Have the students make up a header.
6. Have the students make up a corner and tee post.
7. Explain how rough openings are marked and laid off from center.
8. Explain the difference between a bearing wall and a non-bearing wall.

PERFORMANCE OBJECTIVE 47

CRITERION-REFERENCED MEASURE

Questions

1. Studs will be spaced 16 inches ___________.
2. The header is supported on the ___________.
3. When studs are cut short because of an opening they are ___________ studs.
4. Corner and tee posts are made up using ___________ studs.
5. Rough openings are layed off from the ___________.

Answers

1. On center
2. Trimmer
3. Cripple
4. Straight
5. Center

Practical Application

Have students lay out and construct a wall to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 47 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 47 EVALUATION

FRAMING A WALL

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	**Unsatisfactory**
1. Checked plans for wall specifications.		
2. Selected stock for plates.		
3. Measured and cut top and bottom plates.		
4. Laid out and marked postion of studs, jacks, and wall openings according to plans.		
5. Measured and cut studs.		
6. Set studs and plates on edge next to layout marks.		
7. Nailed each stud in place between plates.		
8. Laid out and cut cripples, headers, jacks, and sills.		
9. Installed headers, cripples, jacks, and sills.		
10. Marked chalk line for positioning.		
11. Squared wall using diagonal measurement method.		
12. Applied sheathing if specified on plans.		
13. Tilted wall upright into place.		
14. Nailed through bottom plate into floor framework.		
15. Braced for plumb.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 48

TASK

Align and brace wall

STANDARD OF PERFORMANCE OF TASK ,

Wall must be straight and plumb and located according to plan. Braces must be of solid 2 x 4 lumber.

SOURCE OF STANDARD

Modern Carpentry, p. 147.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Framed wall
Gauge blocks
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Use standard tool kit.
3. Skilled in the use of a dryline and spacer blocks.

RESOURCE

Wagner. **Modern Carpentry,** pp. 173-188.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry,** pp. 173-188.
2. Lecture on the steps of the task.
3. Stress the need for accuracy in marking and chalking lines.
4. Layout each step and explain in detail.
5. Have students complete the steps in aligning and bracing a wall.

PERFORMANCE OBJECTIVE 48

CRITERION-REFERENCED MEASURE

Questions

1. Use 2 x 4 corner brace to ___________ each end of wall.
2. Nail block on each end and align wall with ___________.
3. Stock for temporary braces need not be ___________ ___________.

Answers

1. Plumb
2. Dryline
3. Straight stock

Practical Application

Have students brace and align a wall to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 48 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 48 EVALUATION

ALIGNING AND BRACING A WALL

Student's Name **Date**

DIRECTIONS TO STUDENT — Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR — Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Selected stock for temporary braces.		
2. Located position of wall from plans and chalked line.		
3. Tilted wall along line and nailed in place.		
4. Positioned brace at wall ends for corner brace.		
5. Drove nail three quarters of the way to hold each brace.		
6. Nailed temporary block in line with each brace at point where brace touches floor.		
7. Plumbed wall.		
8. Nailed each brace to temporary block to hold wall in place.		
9. Checked for plumb perpendicular to wall.		
10. Strung dryline between corners.		
11. Aligned wall with spacer blocks and brace.		
12. Nailed diagonal brace parallel on wall to plumb.		
13. Plumbed parallel to wall.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 49

TASK

Construct plywood box beam

STANDARD OF PERFORMANCE OF TASK

Flanges must be separated by stiffeners for even load distribution. Plywood sheathing must not buckle; glue bond must be tight.

SOURCE OF STANDARD

Modern Carpentry, p. 429.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Nails
Plans and specifications
Plywood
Straight stock

ENABLING OBJECTIVES

1. Identify and use a standard tool kit.
2. Measure accurately.
3. Read plans and specifications.

RESOURCE

Wagner. **Modern Carpentry**, pp. 499-500.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 499-500.
2. Lecture on the design and fabrication of a box beam.
3. Have students design and layout a box beam.
4. Stress the need for good glue bond.
5. Explain the part each member plays in the total unit.

PERFORMANCE OBJECTIVE 49

CRITERION-REFERENCED MEASURE

Questions

1. Plywood box beams can span distances up to ______ feet.
2. The strength of the unit depends on the bond of the ____________.
3. Vertical spacers or ____________ help distribute the load between the upper and lower flange.

Answers

1. 120 feet
2. Glue
3. Stiffeners

Practical Application

Have students construct a plywood box beam to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 49 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 49 EVALUATION

CONSTRUCTING A PLYWOOD BOX BEAM

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans for beam specifications.		
2. Measured distance beam must span.		
3. Determined number and spacing of studs.		
4. Measured and cut plates (flanges).		
5. Measured and cut vertical spacers (stiffeners).		
6. Laid out and marked position of spacers.		
7. Assembled and nailed framework.		
8. Measured and cut plywood sheathing.		
9. Glued sheathing to framework on both sides.		
10. Checked for squareness.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 50

TASK

Install diagonal bracing (wind brace)

STANDARD OF PERFORMANCE OF TASK

Bracing must be installed flush with exterior surface of wall.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Framed wall
Nails
Straight stock

ENABLING OBJECTIVES

1. Recognize the need for wall brace.
2. Skilled in use of circular saw.
3. Layout, mark and measure accurately.

RESOURCE

Wagner. **Modern Carpentry**, pp. 186-187.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 186-187.
2. Discuss the different types of wall bracing.
3. Identify the need for bracing walls.
4. Have students check local building codes for standards.
5. Have students layout a wall brace.

PERFORMANCE OBJECTIVE 50

CRITERION-REFERENCED MEASURE

Questions

1. Exterior walls need some type of ____________ to resist sideway stresses.
2. Walls must be ____________ before cutting in wall bracing.
3. The brace will have a ____________ angle on each end.

Answers

1. Bracing
2. Square
3. 45%

Practical Application

Have students layout and cut in a wall brace to meet standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 50 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 50 EVALUATION

INSTALLING DIAGONAL BRACING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked wall for squareness by measuring diagonals and adjusted as necessary.		
2. Cut specified stock to measured length with 45° angle cut at each end.		
3. Held stock in place and marked each stud.		
4. Set circular saw blade to depth equal to thickness of stock.		
5. Cut saw kerfs into studs along each mark.		
6. Knocked out portion between kerfs on each stud.		
7. Inserted diagonal brace into notch.		
8. Checked for squareness and brace flush with stud.		
9. Nailed brace into each stud.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 51

TASK

Frame floor opening

STANDARD OF PERFORMANCE OF TASK

Floor framing members around large openings must be doubled. Dimensions and location of floor opening must be as specified on plans.

SOURCE OF STANDARD

Residential Carpentry, p. 141.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Joist hangers
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Measure and layout accurately.
3. Use standard tool kit.

RESOURCE

Wagner. **Modern Carpentry**, pp. 160-163.

TEACHING ACTIVITIES

1. Have students read and discuss pp. 160-163 in **Modern Carpentry.**
2. Identify the terms of framing member around an opening.
3. Specify the characteristics of lumber.
4. Stress to students the ability to look down edge of framing to determine crown.
5. Demonstrate the steps of the task.

PERFORMANCE OBJECTIVE 51

CRITERION-REFERENCED MEASURE

Questions

1. After determining the location set ___________ joists in place for floor opening.
2. The length of the ___________ can be taken from the layout on the main joist.
3. The weight of a framed opening is supported by trimmer ___________ .

Answers

1. Trimmer
2. Header
3. Joists

Practical Application

Have students layout and frame an opening in floor to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 51 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 51 EVALUATION

FRAMING AN OPENING IN FLOOR

Student's Name **Date**

DIRECTIONS TO STUDENT	Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.
DIRECTIONS TO EVALUATOR	Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Determined location and dimensions of floor opening from plans.		
2. Selected stock for joists and headers.		
3. Measured and cut floor joists.		
4. Measured and cut trimmer joists.		
5. Measured and cut headers.		
6. Marked rough opening position on joists.		
7. Installed floor joists.		
8. Installed trimmer joists.		
9. Installed double headers.		
10. Measured, cut, and installed tail joists.		
11. Installed joist hangers on all non-supported joist and header ends.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 52

TASK

Frame door opening

STANDARD OF PERFORMANCE OF TASK

Studs must be plumb; dimensions and location of door opening must be as specified on plans.

SOURCE OF STANDARD

Modern Carpentry, p. 123.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Measure accurately.
3. Identify and use a standard tool kit.

RESOURCE

Wagner. **Modern Carpentry,** pp. 175-177.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 175-177.
2. Explain the difference between finish size and rough opening as in window sash and doors.
3. Explain the necessity for using straight stock.
4. Stress the need for accuracy in layout.
5. Demonstrate the steps of the task.

PERFORMANCE OBJECTIVE 52

CRITERION-REFERENCED MEASURE

Questions

1. Measurements are taken from corners on intersecting partition to the ____________ line of an opening.
2. The header is supported by the ____________ stud.
3. The header length will be equal to the rough opening plus ____________ trimmers.

Answers

1. Center
2. Trimmer
3. Two

Practical Application

Have the students frame a door opening to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 52 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 52 EVALUATION

FRAMING A DOOR OPENING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Calculated rough opening size from plans and specifications.		
2. Located position of rough opening from plans.		
3. Laid out rough opening measurements on sill plate and top plate.		
4. Measured and cut studs.		
5. Measured and cut header.		
6. Nailed studs in position.		
7. Nailed header to studs.		
8. Measured and cut trimmer studs.		
9. Measured and cut cripple studs.		
10. Nailed trimmer studs under header.		
11. Nailed cripple studs above header.		
12. Checked corners for squareness.		
13. Adjusted corners, if necessary.		
14. Checked studs for plumb.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 53

TASK

Frame window opening

STANDARD OF PERFORMANCE OF TASK

Window opening must be square and plumb; dimensions and location of window opening must be as specified on plans.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Measure accurately.
3. Identify and use a standard tool kit.

RESOURCE

Wagner. **Modern Carpentry**, pp. 175-177.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 175-177.
2. Explain how rough opening was determined.
3. Explain the necessity for using straight stock.
4. Stress the need for accuracy in layout.
5. Demonstrate the steps of the task.
6. Lay out a window opening on a stud showing sill and header height.

PERFORMANCE OBJECTIVE 53

CRITERION-REFERENCED MEASURE

Questions

1. The studs extending from shoe to header are called ____________ studs.
2. Rough sills are doubled to provide strength and nailing ____________ for stools and aprons.
3. The weight of the ceiling and roof is carried by ____________ .
4. When listing rough openings the ____________ measurement is listed first and the ____________ measurement is listed second.

Answers

1. Trimmer
2. Base
3. Headers
4. Width, height

Practical Application

Have students frame a window opening to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 53 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 53 EVALUATION

FRAMING A WINDOW OPENING

Student's Name **Date**

DIRECTIONS TO STUDENT — Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR — Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Determined location and size of opening from plans.		
2. Laid out width of rough opening and marked plates.		
3. Selected framing stock.		
4. Measured and cut sills and headers.		
5. Measured and cut trimmers.		
6. Marked locations of header and sill on studs.		
7. Nailed header to studs.		
8. Nailed sill to studs.		
9. Nailed trimmers in place.		
10. Measured and cut cripples.		
11. Nailed top and bottom cripples to plates, sill, and header.		
12. Checked corners for squareness.		
13. Adjusted corners, if necessary.		
14. Checked for plumb.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 54

TASK

Frame roof opening

STANDARD OF PERFORMANCE OF TASK

Roof opening frame must not vary from specifications on plans.

For chimney opening:
1. Headers must be set plumb
2. Header tops must be beveled to slope of roof
3. Frame must clear chimney masonry by at least 2 inches on all sides.

For dormer opening:
1. Lower headers must be set plumb
2. Upper headers must be set at right angles to roof slope.

SOURCE OF STANDARD

Residential Carpentry, p. 263.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret specifications and plans.
2. Identify and use steel tape and framing square in standard tool kit.
3. Skilled in use of a circular saw and identify safe use of same when cutting out an opening.
4. Be agile and have no fear of heights.

RESOURCE

Wagner. **Modern Carpentry**, p. 214.

TEACHING ACTIVITIES

1. Have students read and discuss roof opening in **Modern Carpentry**, p. 214.
2. Have students transfer a point from floor to ceiling using a plumb bob.
3. Explain and demonstrate the step off method with framing square.
4. Identify the terms and members in roof framing.
5. Stress the need for accuracy in layout.
6. Demonstrate the steps of the task.

PERFORMANCE OBJECTIVE 54

CRITERION-REFERENCED MEASURE

Questions

1. For chimney openings, headers must be set ____________.
2. Allow a ____________ inch clearance around a chimney opening.
3. In framing large openings, trimmers and headers should be ____________.
4. When framing dormer openings lower headers are set plumb; upper headers are set at ____________ angles to roof slope.

Answers

1. Plumb
2. Two
3. Doubled
4. Right

Practical Application

Have students frame a roof opening to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 54 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 54 EVALUATION

FRAMING AN OPENING IN ROOF

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Determined location and size of opening from plans.		
2. Laid out width of opening on both ridge and top plate.		
3. Measured and marked trimmer.		
4. Cut trimmer rafters.		
5. Nailed trimmer rafters.		
6. Laid out length of opening on rafters.		
7. Measured and marked headers.		
8. Marked location of tops of double headers.		
9. Cut headers.		
10. Beveled tops for chimney openings.		
11. Checked plans for plumb or right angle rafter set.		
12. Nailed headers.		
13. Measured and marked tail rafters.		
14. Cut tail rafters.		
15. Nailed tail rafters at spacing specified on plans.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

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DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 55

TASK

Frame built-up stringer

STANDARD OF PERFORMANCE OF TASK

Stringer must be cut, laid out, and assembled as specified on plans or specifications.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Framing lumber
Nails
Plans and specifications

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Measure accurately.
3. Identify and use framing square, dividers, story pole and standard tool kit.
4. Identify and select the stock for stringer.

RESOURCE

Wagner. **Modern Carpentry**, pp.412-414.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 412-414.
2. Stress accuracy in laying out a stringer mark with sharp pencil or knife.
3. Demonstrate the use of a story pole.
4. Demonstrate a pair of dividers in finding equal distances on a story pole.
5. Identify the terms and members in stringer layout.
6. Demonstrate the performance steps of the task.

PERFORMANCE OBJECTIVE 55

CRITERION-REFERENCED MEASURE

Questions

1. To lay out a stringer you must first find the __________ height.
2. After the stringer is layed off deduct the thickness of the __________ from the bottom end of the stringer.
3. To find the number of risers and treads needed the __________ off method is used.
4. The height of the riser plus the width or tread should measure about __________ inches.

Answers

1. Riser
2. Tread
3. Stepping
4. 17 inches

Practical Application

Have students frame a built up stringer to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 55 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 55 EVALUATION

FRAMING A BUILT UP STRINGER

Student's Name **Date**

DIRECTIONS TO STUDENT	Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.
DIRECTIONS TO EVALUATOR	Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Measured distance between floors to obtain rise in inches.		
2. Calculated number of risers.		
3. Calculated tread width.		
4. Multiplied tread width by number of steps to obtain optimum total run or stringer length.		
5. Laid out stairs on stringer with steel square using previous calculations.		
6. Cut out stringer to fit risers and treads forming carriage stringer.		
7. Measured and cut solid or trimmer stringer as per specifications.		
8. Nailed trimmer stringer to carriage stringer.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 56

TASK

Frame cleated stair stringer

STANDARD OF PERFORMANCE OF TASK

Cleats must be nailed securely and positioned as specified in plans.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Measure accurately.
3. Identify and use framing square, dividers, story pole and standard tool kit.
4. Identify and select the stock for stringer.

RESOURCE

Wagner. **Modern Carpentry**, pp. 412-414.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 412-414.
2. Stress accuracy in laying out a stringer.
3. Demonstrate a pair of dividers in finding equal distances on a story pole.
4. Identify the terms and members in stringer layout.
5. Demonstrate the steps of the task.

PERFORMANCE OBJECTIVE 56

CRITERION-REFERENCED MEASURE

Questions

1. When laying out a stringer use the edge of the tongue to mark the ____________ and the body of the framing square to mark the ____________.
2. All risers should be ___________ in height.
3. The procedure for laying out a stringer is similar to a ___________ layout.

Answers

1. Riser, tread
2. Equal
3. Rafter

Practical Application

Have students frame a cleated stair stringer to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 56 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 56 EVALUATION

FRAMING A CLEATED STAIR STRINGER

Student's Name **Date**

DIRECTIONS TO STUDENT — Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR — Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	**Unsatisfactory**
1. Measured distance between floors to obtain rise.		
2. Calculated number of risers.		
3. Calculated tread width.		
4. Multiplied tread width by number of steps to obtain optimum total run.		
5. Laid out stairs on stringer with steel square using previous calculations.		
6. Selected and cut one cleat for each step, equal in length to tread width.		
7. Nailed cleats in place under tread layout marks.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

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DUTY INSTALLING ROUGH FRAME

PERFORMANCE OBJECTIVE 57

TASK

Install floor joists

STANDARD OF PERFORMANCE OF TASK

All joists must be level, plumb with crowns up, and must be parallel and spaced as specified on plans.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Measure and layoff accurately.
3. Identify lumber in terms, type, and usability.
4. Use standard tool kit.

RESOURCE

Wagner. **Modern Carpentry**, pp. 158-159.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 158-159.
2. Explain the method of turning crown up.
3. Discuss the spacing of floor joists.
4. Explain why some floor joists are doubled to support extra loads.
5. Demonstrate the steps of the task.

PERFORMANCE OBJECTIVE 57

CRITERION-REFERENCED MEASURE

Questions

1. When placing a floor joist the ___________ must be turned up.
2. The most common spacing of floor joist is ___________ o. c.
3. Where extra loads need to be supported floor joists are ___________ .

Answers

1. Crown
2. 16"
3. Doubled

Practical Application

Have students measure, cut, and install floor joists.

Method of Evaluating Practical Application

Use Checklist Performance Objective 57 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 57 EVALUATION

INSTALLING FLOOR JOISTS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Determined direction and specifications of floor joists.		
2. Laid out header joists on sill plate in platform construction.		
3. Attached headers to sill.		
4. Measured and cut end bands in sill installation.		
5. Nailed end bands in position.		
6. Determined location of floor openings from plans.		
7. Laid out and marked floor joists positions on header joists or sill plates.		
8. Measured and cut floor joists.		
9. Nailed joists in place.		

APPROVED: YES ____ NO ____

Evaluator's Signature Date

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 58

TASK

Install cross-bridging

STANDARD OF PERFORMANCE OF TASK

Cross-bridging must be installed in straight line at intervals not to exceed 8 feet.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Measure accurately.
3. Identify and use a standard tool kit.

RESOURCE

Wagner. **Modern Carpentry**, pp. 162-164.

TEACHING ACTIVITIES

1. Have the students read and discuss **Modern Carpentry**, pp. 162-164.
2. Demonstrate the method of laying out the cuts with a framing square.
3. Explain the necessity of using good straight grain stock.
4. Lecture on the types of bridging.
5. Demonstrate the steps of the task.

PERFORMANCE OBJECTIVE 58

CRITERION-REFERENCED MEASURE

Questions

1. Cross bridging fifteen pieces of lumber set diagonally between two joists forming an X is sometimes called ___________.
2. Building codes require bridging to be installed in spans no more than ___________ feet.
3. Nail cross bridging on top and leave lower end loose until ___________ is installed.
4. In odd size spaces, with a run of cross bridging, ___________ bridging can be used.

Answers

1. Herringbone
2. 8 feet
3. Floor
4. Solid

Practical Application

Have students cut and install cross bridging to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 58 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 58 EVALUATION

INSTALLING CROSS-BRIDGING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Located position of bridging from plans.		
2. Measured length from top of joist to bottom of adjacent joist.		
3. Calculated angle of cut.		
4. Cut two pieces of bridging for each joist space.		
5. Strike chalk line across tops of joists.		
6. Secured each bridging to top of each joist with two nails.		
7. Secured bottoms of bridging after installation of subfloor.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 59

TASK

Install ceiling joists

STANDARD OF PERFORMANCE OF TASK

Joists must be parallel and spaced as specified on plans and specifications; and joists must be installed crown side up.

SOURCE OF STANDARD

Residential Carpentry, p. 188.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Lay out and measure accurately.
2. Read and interpret plans and specifications.
3. Identify lumber in terms of type and usability.

RESOURCE

Wagner. **Modern Carpentry**, p. 189.

TEACHING ACTIVITIES

1. Have the student read and discuss **Modern Carpentry**, pp. 189-192.
2. Have students list types of ceiling materials describing weight of ceiling and use of attic space have bearing on sizes and spacing.
3. Demonstrate the method of toe nailing.
4. Demonstrate the method of turning joists with crown in same direction when placing joists on saw horses which must be done before cutting roof slope on top edge of joists.

PERFORMANCE OBJECTIVE 59

CRITERION-REFERENCED MEASURE

Questions

1. When placing and nailing ceiling joist turn ___________ edge up.
2. The upper corner of the joist that is placed on the outside wall must be cut at an angle to match ___________ slope.
3. On low pitched hip roof construct short ___________ joists that run perpendicular to joists.

Answers

1. Crown
2. Roof
3. Stub

Practical Application

Have the students install ceiling joists to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 59 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 59 EVALUATION

INSTALLING CEILING JOISTS

Student's Name **Date**

DIRECTIONS TO STUDENT — Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR — Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Determined length and spacing of joists from plans.		
2. Selected and measured joist stock.		
3. Cut joist to length squaring one end.		
4. Calculated and cut angle of joist ends as necessary.		
5. Laid out and marked on top plates.		
6. Set second joist from corner in position.		
7. Toenailed through sides of joists nailing outer ends first.		
8. Lined up each joist on top plate, marked and toenailed.		
9. Cut and installed firestops as required.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 60

TASK

Construct post and beam framing

STANDARD OF PERFORMANCE OF TASK

Planks for floor framing must be long enough to bridge a minimum of two spans between beams; two metal straps must be used to connect spliced beams at each post; beams must be connected with metal gusset plates and secured to posts with framing anchors in roof framing; framing must be square and plumb and must meet plans and specifications.

SOURCE OF STANDARD

Residential Carpentry, pp. 306, 308, and 310.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Beam hangers
Beams
Chain saw
Circular saw
Framing anchors
Gusset plates
Metal strapping
Nails
Plans and specifications
Posts
Roof planking
Spikes
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Identify lumber in terms of type and usability.
3. Identify and use standard tool kit, circular saw, chain saw.

RESOURCE

Wagner. **Modern Carpentry,** pp. 489-501.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry,** pp. 489-501.
2. Have students discuss the advantages of post and beam construction.
3. Have students list and discuss different kinds of metal fasteners.
4. Lecture on size and length of posts beams and decking (random lengths).
5. Review basic termonologies pertaining to post and beam construction.
6. Explain to students to use care in reassembling posts and beams.
7. Demonstrate the use of a chain saw in the cutting of posts and beams.
8. Discuss with students safety due to size and weight of some timbers.
9. Demonstrate the procedure for laying out, cutting, and erecting a post and beam building.

PERFORMANCE OBJECTIVE 60

CRITERION-REFERENCED MEASURE

Questions

1. Post and beam construction is also known as __________ and __________.
2. Beams may be __________ or__________ _____, left exposed, or cased according to plans and specifications.
3. Transverse beams or roof beams rest on a ____________ but need support against lateral movement.

Answers

1. Plank, beam
2. Solid, built up
3. Post

Practical Application

Have students construct post and beam framing to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 60 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 60 EVALUATION

CONSTRUCTING POST AND BEAM FRAMING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans for post and beam placement.		
2. Laid out and marked post placement on sill plates.		
3. Determined number and specifications for posts and beams.		
4. Selected posts and beams.		
5. Measured and cut stock for posts.		
6. Cut or constructed beams as required.		
7. Installed posts and beams for: Floor framing a. Installed fasteners for posts as per plans and specifications. b. Drilled posts to receive fasteners. c. Centered posts. d. Attached posts loosely. e. Checked for plumb. f. Secured posts permanently. g. Added bearing blocks to posts. h. Spliced beams. i. Connected spliced beams with metal straps.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 60 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
7. Installed posts and beams for:		
Wall framing		
a. Measured and cut blocks for side wall center posts.		
b. Toenailed center posts to edge joists and blocking.		
c. Measured and cut studs.		
d. Measured and cut top and bottom plates.		
e. Marked plates for stud locations.		
f. Assembled wall components.		
g. Lifted wall section into place.		
h. Nailed wall section through bottom plate.		
i. Straightened and braced wall.		
j. Assembled , nailed, and braced remaining wall sections.		
k. Installed diagonal bracing.		
l. Secured top plates with steel strapping.		
m. Installed blocking.		
Roof framing		
a. Checked plans for post spacing for ridgeboard.		
b. Installed interior posts.		
c. Cut ridgeboard members to length.		
d. Positioned first section of ridgeboard on posts.		
e. Fastened beam to post with framing anchors.		
f. Positioned remaining sections of ridgeboard and fastened.		
g. Connected ridgeboard members with gusset plates.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 60 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
7. Installed posts and beams for: h. Checked plans for treatment of ridge and plate. i. Determined length of rafter beams from plans. j. Cut and notched all upper ends of rafter beams. k. Cut and notched lower ends of rafter beams. l. Marked beam locations on ridgebeam. m. Positioned center rafter over wall post. n. Toenailed center rafter in place. o. Fitted rafter beam in position. p. Toenailed rafter beam in place. q. Attached rafter beam to plate with framing anchor. r. Toenailed and secured remaining rafter beams until all pairs of rafter beams were in place, working from center out. s. Nailed metal strapping across tops of pairs of beams.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 61

TASK

Install steel beam

STANDARD OF PERFORMANCE OF TASK

Beam must be located as specified on plans; and beam must be level across entire span.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Fasteners
Hoist
Plans and specifications
Steel beam
Straight stock
Support posts

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Identify steel beams, types and usability.
3. Have experience in the use of a hoist.
4. Identify and use leveling tools.

RESOURCE

Wagner. **Modern Carpentry**, pp. 154-156.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 154-156.
2. Stress safety procedures.
3. Have students discuss the methods of jointing wood joists to steel beam.
4. Explain and discuss supports for steel beams.
5. Have students complete the steps in the performance of the task.

PERFORMANCE OBJECTIVE 61

CRITERION-REFERENCED MEASURE

Questions

1. The two types of steel beams used in residential construction are the __________ and __________.
2. Steel rims vary in width of __________ and depth of __________.
3. When crossing steel beams with wood allow at least __________ space above beam for shrinkage.

Answers

1. S-beam, W-beam
2. Flange, web
3. 3/8"

Practical Application

Have the students install a steel beam to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 61 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 61 EVALUATION

INSTALLING A STEEL BEAM

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Located position of beam from plans.		
2. Laid out position of support posts.		
3. Installed support posts and brace.		
4. Lifted steel beam into place.		
5. Leveled beam.		
6. Fastened beam to support posts.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 62

TASK

Install lally post

STANDARD OF PERFORMANCE OF TASK

Post must be plumb, tight, and located as specified on plans.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Fasteners
Lally post
Plans and specifications

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Identify and use standard tool kit.
3. Measure accurately.

RESOURCE

Wagner. **Modern Carpentry**, pp. 152-154.

TEACHING ACTIVITIES

1. Have the students read and discuss **Modern Carpentry**, pp. 152-154.
2. Have students list and discuss types of posts.
3. Discuss posts that adjust in height.
4. Demonstrate the steps in the performance of the task.

PERFORMANCE OBJECTIVE 62

CRITERION-REFERENCED MEASURE

Questions

1. To support a 6 inch wide girder use a _______ x _______ post if height is less than 9 feet.
2. Steel posts should be capped with a steel __________ to provide good bearing.
3. When supporting a steel girder with a wood post a __________ __________ is desirable.

Answers

1. 6" x 6"
2. Plate
3. Metal cap

Practical Application

Have the students install a lally post to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 62 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 62 EVALUATION

INSTALLING A LALLY POST

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Determined position of post from plans and specifications.		
2. Measured distance between floor and beam.		
3. Screwed in adjustable plate to shortest length.		
4. Inserted rough adjustment pin in hole just less than desired length adjustment.		
5. Positioned pole under beam.		
6. Adjusted plate until pole fits tightly.		
7. Checked plumb in both directions and adjusted as necessary.		
8. Attached pole to beam and secured to floor.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 63

TASK

Install backing for hanging fixture and cabinet

STANDARD OF PERFORMANCE OF TASK

Backing must be at height specified on plans and specifications and must provide secure backing for wood screws.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Framed wall
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Identify lumber in terms of type and usability.
3. Measure accurately.

RESOURCE

Wagner. **Modern Carpentry**, pp. 184-185.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 184-185.
2. Stress the importance of providing clearances when framing for a fixture.
3. Stress the need for all blocking to be in place before finishing wall and ceiling.
4. Demonstrate let-in blocking and fitted between studs blocking.
5. Demonstrate all the steps in the performance of task.

PERFORMANCE OBJECTIVE 63

CRITERION-REFERENCED MEASURE

Questions

1. ___________ blocking will simplify the task of nailing base board by allowing nailing back from end eliminating the possibility of splitting the wood.
2. A wall hung lavatory requires ___________ in order to secure it to a finished wall.
3. Blocking can be ___________ or ___________ . The length would determine the method.

Answers

1. Corner
2. Blocking
3. Let-in, cut-in

Practical Application

Have the students install backing for hanging fixture and cabinet to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 63 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 63 EVALUATION

INSTALLING BACKING FOR HANGING FIXTURE AND CABINET

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Determined final placement of cabinet or fixture from plans and specifications.		
2. Measured height at which screws for holding fixture or cabinets will be placed, allowing for difference between subfloor and finished floor in measurement.		
3. Transferred measurement to studs.		
4. Cut and measured blocks to fit between studs.		
5. Nailed blocks in place at desired height.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 64

TASK

Install exterior wall sheathing

STANDARD OF PERFORMANCE OF TASK

Sheathing must be installed with no protrusions in openings or beyond corners; and sheathing must be nailed according to plans and specifications.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Framed wall
Nails
Sheathing
Plans and specifications

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Identify sizes and types of wall sheathing.
3. Identify and use standard tool kit and circular saw.

RESOURCE

Wagner. **Modern Carpentry**, pp. 188-189.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 188-189.
2. Have students list and discuss types of wall sheathing.
3. List types of sheathing that eliminates wall bracing.
4. List types that add insulating value.
5. Demonstrate the steps in the performance of the task.

PERFORMANCE OBJECTIVE 64

CRITERION-REFERENCED MEASURE

Questions

1. When using plywood for wall sheathing ___________ ___________ can be eliminated.
2. Allow a ___________ inch space between joints when using fiber board sheathing.
3. Wall sheathing should be applied before ___________ framing is started because sheathing adds strength and rigidity to walls.

Answers

1. Corner bracing
2. 1/8
3. Roof

Practical Application

Have students install exterior wall sheathing to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 64 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 64 EVALUATION

INSTALLING EXTERIOR WALL SHEATHING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications.		
2. Determined layout of sheathing from stud spacing.		
3. Measured and cut sheathing to fit from corner edge to stud center.		
4. Nailed first sheet in place.		
5. Measured and cut rough openings as necessary.		
6. Nailed subsequent sheets butting sides.		
7. Measured and cut final sheet to be flush on outside corner.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 65

TASK

Install batten

STANDARD OF PERFORMANCE OF TASK

Battens must be spaced according to plans and specifications and cover all sheathing joints.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Caulking
Caulking gun
Nails
Plans and specifications
Sheathed exterior wall
Wooden strips

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Identify and use standard tool kit.
3. Measure accurately.

RESOURCE

Wagner. **Modern Carpentry**, p. 310.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, p. 310.
2. Discuss the types of siding that uses a batten.
3. Have students calculate vertical siding and battens for a given wall.
4. Discuss extra framing needed for applying a batten.
5. Demonstrate how to lay out the steps of the task.

PERFORMANCE OBJECTIVE 65

CRITERION-REFERENCED MEASURE

Questions

1. Board and batten siding are wide square edge boards spaced about ____________ inch apart covered with a batten.
2. Extra ____________ between studs give a nailing base for vertical boards.
3. The boards for siding should be no more than ____________ wide.

Answers

1. 1/2
2. Blocking
3. 8"

Practical Application

Have the students cut and install a batten to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 65 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 65 EVALUATION

INSTALLING A BATTEN

Student's Name Date

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Determined batten spacing from plans and specifications.		
2. Caulked exterior joint on sheathing.		
3. Laid out and marked batten placement covering joint.		
4. Measured and cut batten strip.		
5. Nailed batten strip over sheathing as marked.		
6. Continued nailing batten strips over sheathing until all battens are in place.		

APPROVED: YES ____ NO ____

Evaluator's Signature Date

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 66

TASK

Install plyscore subflooring

STANDARD OF PERFORMANCE OF TASK

Subflooring must be tight, free of squeaks with nail heads flush; plyscore subflooring joints must be staggered.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Glue gun
Nails
Plans and specifications
Plyscore

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Identify material in terms of type and usability.
3. Use standard tool kit.

RESOURCE

Wagner. **Modern Carpentry**, pp. 169-170.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 169-170.
2. Explain the need for good glue bond.
3. Stress the fact that all nailing must be completed before glue sets.
4. Have students read and discuss material specifications and application.
5. Demonstrate the steps in the performance of the task.

PERFORMANCE OBJECTIVE 66

CRITERION-REFERENCED MEASURE

Questions

1. Provide a ________ inch space at all end and edge joists.
2. Place a ________ inch bead of glue on each joist and ________ inch beads where panels join.
3. Nail all panels before ____________ sets.

Answers

1. 1/8
2. 1/4, 2
3. Glue

Practical Application

Have the students install plyscore subflooring to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 66 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 66 EVALUATION

INSTALLING PLYSCORE SUBFLOORING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	**Unsatisfactory**
1. Checked plans for subfloor specifications.		
2. Measured deck for square.		
3. Struck line on joist according to width of plyscore.		
4. Ran glue bead on joist.		
5. Aligned first full sheet.		
6. Nailed sheet.		
7. Completed first row.		
8. Continued to glue and nail sheets in place until subfloor is completed.		
9. Trimmed ends.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 67

TASK

Install metal studs

STANDARD OF PERFORMANCE OF TASK

Metal studs must be laid out on center as specified on plans. Studs must be plumb and fastened to top and bottom track plates with self-tapping screws; and track plate must be securely fastened.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Metal stud systems
Plans and specifications
Power-actuated screw gun
Self-tapping screws

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Measure accurately.
3. Identify and use power screw gun and standard tool kit.

RESOURCE

Wagner. **Modern Carpentry**, pp. 25-26.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 25-26.
2. Explain to students that metal stud walls are usually designed for nonload walls.
3. Stress accuracy in lay out and cutting.
4. Demonstrate how to lay out the task.
5. Demonstrate the steps in the performance of the task.

PERFORMANCE OBJECTIVE 67

CRITERION-REFERENCED MEASURE

Questions

1. Metal stud walls are usually __________ __________ bearing walls. They are used as partition walls or dividers.
2. The fasteners are __________ __________ screws, eliminating the boring of holes for screws.
3. A jack saw or a suitable tool is used to __________ metal studs to length.

Answers

1. Non load
2. Self-tapping
3. Cut

Practical Application

Have the students install metal studs to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 67 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 67 EVALUATION

INSTALLING METAL STUDS

Student's Name **Date**

DIRECTIONS TO STUDENT
Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR
Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Laid out metal studs as specified on plans and specifications.		
2. Fastened bottom and top metal track plate.		
3. Cut studs to fit between top and bottom metal track plates.		
4. Positioned studs to metal track plates.		
5. Checked stud spacing.		
6. Checked plumb and adjusted as necessary.		
7. Fastened studs to metal track plates.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 68

TASK

Set metal door frame for masonry construction

STANDARD OF PERFORMANCE OF TASK

Metal door frame must be plumb, square, and level.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Metal door frame
Nails
Plans and specifications
Straightedge
Straight stock
Wire

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Identify terms, level, plumb and square.
3. Measure accurately.

RESOURCE

Kren, Sr., R.T. **Advanced Masonry Skills**, pp. 441-442.

TEACHING ACTIVITIES

1. Have students read and discuss, **Advanced Masonry Skills**, pp. 441-442.
2. Stress accuracy in measuring and marking center of door opening.
3. Have students check plans for door swing and setting position. (Plan will show how door swings)
4. Show how to check masonry ties for proper positioning.
5. Explain to students the need for double checking for plumb, level square and in proper position to wall.
6. Stress accuracy in the procedure of setting frame.

PERFORMANCE OBJECTIVE 68

CRITERION-REFERENCED MEASURE

Questions

1. To keep the frame the same width bottom to top a____________ is used.
2. The door opening is laid out from the ____________ on plans.
3. Facing a door, if the hinges were on left, the knob on right, it would be a ____________ ____________ door.

Answers

1. Spreader
2. Center
3. Right hand

Practical Application

Have students set a metal door frame for masonry construction to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 68 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 68 EVALUATION

SETTING A METAL DOOR FRAME FOR MASONRY CONSTRUCTION

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans for size and location of frame.		
2. Cut spreader for bottom and middle of frame to maintain same size as head of door as necessary.		
3. Wired spreader in place as necessary.		
4. Positioned frame.		
5. Leveled head.		
6. Tacked braces to frame.		
7. Plumbed frame.		
8. Aligned frame with level and straightedge.		
9. Checked for squareness and adjusted as necessary.		
10. Rechecked plumb, square, and level.		
11. Realigned frame as necessary.		
12. Removed braces after masonry is set.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 69

TASK

Set metal window frame for masonry construction

STANDARD OF PERFORMANCE OF TASK

Metal window frame must be plumb, level, and square.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Metal window frame
Nails
Plans and specifications
Straightedge
Straight stock
Wire

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Identify terms level, plumb and square.
3. Measure accurately.

RESOURCE

Kren, Sr., R.T. **Masonry Skills**, pp. 184-185.

TEACHING ACTIVITIES

1. Have students read and discuss **Masonry Skills**, pp. 184-185.
2. If metal window is not fixed type, show how to check verification of opening operations.
3. Stress accuracy in laying out from center of window.
4. Lecture on the different types and sizes of metal windows.
5. Explain to students most metal windows are sized to masonry work.
6. Instruct students in the proper procedure of setting a metal window.

PERFORMANCE OBJECTIVE 69

CRITERION-REFERENCED MEASURE

Questions

1. When using the level on a sill and header the term is called ___________.
2. Using the level on sides is called ___________.
3. To maintain equal measurement from bottom to top a ___________ is used.

Answers

1. Leveling
2. Plumbing
3. Spreader

Practical Application

Have the students set a metal window frame in masonry construction to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 69 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 69 EVALUATION

SETTING A METAL WINDOW FRAME IN MASONRY CONSTRUCTION

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications for size and location of frame.		
2. Cut spreader for middle of frame to maintain top and bottom sizes.		
3. Wired spreader in place.		
4. Positioned frame.		
5. Leveled frame.		
6. Tacked braces to frame.		
7. Plumbed frame.		
8. Aligned frame.		
9. Checked top squareness and adjusted as necessary.		
10. Realigned frame as necessary.		
11. Rechecked plumb, level, and square.		
12. Removed braces after masonry is set.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 70

TASK

Construct roof truss

STANDARD OF PERFORMANCE OF TASK

All members of truss must form rigid framework for load support over span; tail cuts must be plumb; and peak and intermediate gussets must be nailed to both sides of truss.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Connector plates
Nails
Plans and specifications
Plywood for gussets
Portable circular saw
Straight stock
T-Bench

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Use circular saw and standard tool kit.
3. Identify lumber in terms of type and usability.

RESOURCE

Wagner. **Modern Carpentry**, pp. 219-223.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 219-223.
2. Have students draw a sketch of a roof truss.
3. Identify the terms, span, run, rise and pitch.
4. Have the students calculate all materials.
5. Have the students lay out and complete the steps in the performance of the task.

PERFORMANCE OBJECTIVE 70

CRITERION-REFERENCED MEASURE

Questions

1. The raising of the bottom cord to allow for sag is called ___________ .
2. The run is 1/2 of the ___________.
3. One of the advantages of using trusses is the two outside walls are the ___________ walls.

Answers

1. Camber
2. Span
3. Bearing

Practical Application

Have the students construct a roof truss to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 70 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 70 EVALUATION

CONSTRUCTING A ROOF TRUSS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications for building dimensions.		
2. Calculated span, run, rise, and roof pitch.		
3. Snapped chalk lines for two top chords and one bottom chord.		
4. Laid out truss pattern.		
5. Calculated plumb cut and tail cuts for top and bottom chords.		
6 Cut top chords.		
7. Cut bottom chord.		
8. Calculated length of tension webs.		
9. Cut tension webs.		
10. Calculated length of compression webs.		
11. Cut compression webs.		
12. Assembled truss and pin with nails, truss clips, or connector plates.		
13. Cut peak and intermediate gussets for both sides of truss.		
14. Nailed gussets to peak and bottom chord on both sides of truss.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 71

TASK

Install collar beams

STANDARD OF PERFORMANCE OF TASK

Tops of collar beams must be slightly below tops of rafters; and collar beams must be of size and spacing specified on plans.

SOURCE OF STANDARD

Residential Carpentry, p. 232.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Framed roof
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifcations.
2. Measure accurately.
3. Identify and use standard tool kit.

RESOURCE

Wagner. **Modern Carpentry**, pp. 215-216.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 215-216.
2. Explain the function of a collar beam.
3. Discuss stock used for collar beams.
4. Demonstrate the method of laying out end cut of a collar beam.
5. Have the students lay out the steps in the performance of the task.

PERFORMANCE OBJECTIVE 71

CRITERION-REFERENCED MEASURE

Questions

1. Size and spacing of collar beams will be specified on ___________.
2. Tops of collar beams will be slightly below tops of ___________.
3. Collar beams provide ___________ and stiffening and hold rafter and ridge together.

Answers

1. Plans
2. Rafters
3. Bracing

Practical Application

Have the students lay out, cut, and install a collar beam to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 71 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 71 EVALUATION

INSTALLING COLLAR BEAMS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Determined size, spacing, and height of collar beams from plans and specifications.		
2. Marked height on one side of rafters.		
3. Chalked line between marks.		
4. Marked height on other side of rafters.		
5. Chalked line between marks.		
6. Measured span across opposite marks.		
7. Cut one collar to span measurement for specified rafter pairs.		
8. Nailed collars in places marked on rafters.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 72

TASK

Install overhang purlin

STANDARD OF PERFORMANCE OF TASK

Overhang purlin must be positioned as on plans; and rafters must be notched around purlin with no gaps.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Lay out and measure accurately.
3. Identify and use standard tool kit.

RESOURCE

Wagner. **Modern Carpentry**, pp. 206-207.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 206-207.
2. Stress accuracy in notching for lookouts.
3. Have students select straight stock for Purlins.
4. Have students layout and notch an end rafter.
5. Have students lay out the steps in the performance of the task.

PERFORMANCE OBJECTIVE 72

CRITERION-REFERENCED MEASURE

Questions

1. All purlins will be selected from ___________ stock.
2. Notch rafters for purlin according to ___________.
3. All purlins must fit ___________ without gaps.

Answers

1. Straight
2. Plans
3. Notches

Practical Application

Have the students cut and install overhang purlins to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 72 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 72 EVALUATION

INSTALLING OVERHANG PURLIN

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications for purlin position.		
2. Selected purlins from straight stock.		
3. Measured and cut purlins to length.		
4. Laid out and marked purlins on rafters.		
5. Notched rafters as necessary.		
6. Fitted and nailed purlins in notches.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 73

TASK

Install rafter support purlin

STANDARD OF PERFORMANCE OF TASK

Support purlin for rafter must be positioned as on plans and specifications.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Measure and layout accurately.
3. Identify and use standard tool kit.

RESOURCE

Wagner. **Modern Carpentry**, pp. 215-216.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 215-216.
2. Explain how support purlin transfers load from roof to bearing partitions.
3. Lay out and explain how load can be transferred to two points by trussing support purlins.
4. Explain the necessity of installing support purlins and collar beams.
5. Lecture on the use of the brace table with laying off braces.

PERFORMANCE OBJECTIVE 73

CRITERION-REFERENCED MEASURE

Questions

1. Support purlin is ___________ to transfer roof load to bearing partitions.
2. ______ x ______ stock can be used for bracing under purlin.
3. Bracing for support purling should be spaced according to ___________.

Answers

1. Bracing
2. 2 x 4
3. Plans

Practical Application

Have the students install support purlin to standard specfications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 73 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 73 EVALUATION

INSTALLING RAFTER SUPPORT PURLIN

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for rafter support.		
2. Selected purlins from straight stock.		
3. Chalked line as specified in plans for required support.		
4. Measured and cut purlins to length.		
5. Fitted purlin in position on chalk line.		
6. Nailed through purlin into rafter.		
7. Nailed bottom of purlin to base.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 74

TASK

Install ridgeboard

STANDARD OF PERFORMANCE OF TASK

Ridgeboard must be straight and level and braced when required; rafter crowns must be turned upward and spaced according to plans.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Ceiling joists in place
Circular saw
Nails
Plans and specifications
Rafters
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Recognize and state the characteristics of lumber.
3. Measure and lay out accurately.
4. Identify and use standard tool kit.

RESOURCE

Wagner. **Modern Carpentry**, pp. 204-206.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 204-206.
2. Explain the term crowning and the method of recognizing a crown in lumber.
3. Discuss lay off and cutting ridge to join center of rafter.
4. Stress accuracy in lay out, cutting, and nailing.
5. Have students complete the steps in the performance of the task.

PERFORMANCE OBJECTIVE 74

CRITERION-REFERENCED MEASURE

Questions

1. When ceiling joists and rafters are on 16" centers, rafter should be toe nailed to plate and nailed to __________ __________. This ties the two members together.
2. Joints in ridge should occur at center of __________.
3. When nailing rafters to ridge, first nail through ridge into rafter then ________ ________ rafter on opposite side. This will keep joints tight and ridge straight.

Answers

1. Ceiling joist
2. Rafter
3. Toe nail

Practical Application

Have the students install a ridge board to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 74 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 74 EVALUATION

INSTALLING A RIDGE BOARD

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Determined length of ridgeboard from plans.		
2. Laid out and marked rafter spacing on ridgeboard.		
3. Measured and cut ridgeboard.		
4. Nailed two end rafters to one side of ridgeboard.		
5. Lifted ridgeboard and attached to two other end rafters to opposite side of ridgeboard.		
6. Nailed all four rafters at base of rafter.		
7. Plumbed and braced rafter-ridgeboard assembly.		
8. Adjusted as necessary.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 75

TASK

Install common rafters

STANDARD OF PERFORMANCE OF TASK

Top cuts of common rafters must fit ridgeboard; bird's mouth depth must be as specified and must fit base; tail cut must be plumb; and rafter must be as specified on plans.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Ceiling joists in place
Circular saw
Nails
Plans and specifications
Sawhorses
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans.
2. Identify the method of laying out a common rafter.
3. Identify terms that are basic in rafter layout.
4. Use standard tool kit.

RESOURCE

Wagner. **Modern Carpentry**, pp. 201-207.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 201-207.
2. Stress accuracy in laying out the cutting and fitting of a rafter.
3. Explain the methods of laying out a common rafter, using step-off method, and the rafter table from framing square.
4. Identify lumber in terms of type and usability.
5. Instruct students in laying out a common rafter.
6. Demonstrate the method of crowning stock on saw horses.

PERFORMANCE OBJECTIVE 75

CRITERION-REFERENCED MEASURE

Questions

1. The run is one half of the ___________.
2. The final step in laying out a rafter is shortening the rafter ___________ of the ridge.
3. Most carpenters prefer to use the ______________ method to lay out common rafters.

Answers

1. Span
2. 1/2
3. Step-off

Practical Application

Have students install common rafters to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 75 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 75 EVALUATION

PERFORMANCE TEST FOR INSTALLING COMMON RAFTERS

Student's Name Date

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Measured width of building for span.		
3. Divided span in half for run.		
4. Calculated length of rafter using run, rise, and framing square.		
5. Established crown of rafter stock.		
6. Placed one piece of rafter stock on sawhorses.		
7. Laid out and marked rafter pattern.		
8. Drew bird's mouth.		
9. Checked plans for size of rafter overhang.		
10. Laid out overhang.		
11. Marked tail cut.		
12. Checked cornice details on plans.		
13. Shortened rafter for ridgeboard.		
14. Cut rafter on marks.		
15. Labeled rafter as pattern rafter.		
16. Cut all rafters using pattern.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 75 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
17. Checked fit of rafters at ridge, plate, and tail cut.		
18. Cut all rafters.		
19. Nailed rafters to plates and ridgeboard.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 76

TASK

Install tail rafters

STANDARD OF PERFORMANCE OF TASK

Size of tail rafters must be as specified on plans. Plumb cuts and seat cuts must be same as on common rafters. Tops and ends of tail rafters must be even, and all tail rafters must be nailed in place.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Nails
Plans and specifications
Rafters in place
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Identify the method of laying out a tail rafter.
3. Identify and use standard tool kit.

RESOURCE

Wagner. **Modern Carpentry**, pp. 199-204.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 199-204.
2. Identify terms basic in roof framing.
3. Instruct students in use of framing square to make plumb and seat cuts.
4. Instruct students in layout and attachment of tail rafters.
5. Explain the method and importance of checking for rafter alignment.

PERFORMANCE OBJECTIVE 76

CRITERION-REFERENCED MEASURE

Questions

1. The part of a rafter that extends beyond the plate is the overhang or ___________.
2. When there is no overhang the rafter ends with a ___________ cut and a ___________ cut.
3. Tail rafters are nailed to sides of a ___________ rafter.

Answers

1. Tail
2. Seat, plumb
3. Common

Practical Application

Have students install a tail rafter to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 76 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 76 EVALUATION

INSTALLING A TAIL RAFTER

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for number of tail rafters.		
2. Laid out tail rafters.		
3. Calculated plumb cut and seat cut using rise and run of common rafters.		
4. Cut tail rafters.		
5. Nailed two end tail rafters to sides of common rafters.		
6. Stretched and secured dryline from top edge of one tail rafter to another.		
7. Installed and nailed tail rafter to sides of common rafter at dryline.		
8. Installed remaining rafters at dryline.		
9. Checked alignment of tail rafters.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 77

TASK

Install cripple jack rafters

STANDARD OF PERFORMANCE OF TASK

Cripple jack rafters must have same rise as roof and must fit between hip and valley rafters with no gaps. Hip and valley rafters must not be bowed; and all rafters must be nailed and located as specified on plans.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Hip and valley rafters in place
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Identify the method of laying out a jack rafter.
3. Identify and use standard tool kit.

RESOURCE

Wagner. **Modern Carpentry**, pp. 210-214.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 210-214.
2. Identify lumber in terms of type and usability.
3. Explain the common difference measurement and how it is calculated using the framing square.
4. Review basic terminology pertaining to roofing and explain terminologies unique to jack rafters.
5. Demonstrate the procedures for laying out, calculating, cutting, and installing a hip roof using jack rafters.

PERFORMANCE OBJECTIVE 77

CRITERION-REFERENCED MEASURE

Questions

1. When spaced equal along the plate the change in length from one jack rafter to the next is always the ___________. The term for this is called the common difference.
2. The run of the valley, hip cripple jack is equal to the wall ___________.
3. Jack rafters are short rafters that run between valley and ___________ rafter.

Answers

1. Same
2. Plate
3. Hip

Practical Application

Have students install cripple jack rafters to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 77 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 77 EVALUATION

INSTALLING CRIPPLE JACK RAFTERS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Calculated rise and run of roof.		
3. Calculated length of cripple jack rafter.		
4. Established crown of straight stock.		
5. Laid out and marked side cuts on top and bottom on crowned stock; top side cut must be same angle as hip rafter and bottom side cut must be same angle as valley rafter.		
6. Laid out and marked hip and valley rafters to receive cripple jacks.		
7. Measured and cut cripple jack rafters.		
8. Nailed cripple jacks top and bottom. (NOTE: Do not bow hip or valley rafters.)		
9. Checked alignment of cripple jack rafters.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 78

TASK

Install hip rafter

STANDARD OF PERFORMANCE OF TASK

Hip rafter must fit ridge, top plate, and common rafters with no gaps. Top of common rafters and center of hip rafter must be aligned; end of hip rafter projection must be aligned with common rafter; and hip rafter must be nailed and located as specified on plans.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Common rafters in place
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Identify terms that are basic in roof framing.
3. Identify and use standard tool kit.

RESOURCE

Wagner. **Modern Carpentry**, pp. 207-210.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 207-210.
2. Demonstrate how to recognize and identify lumber in terms of type and usability.
3. Review basics in rafter layout and terminology pertaining to roofs.
4. Demonstrate lining hip rafter with dry line using the center of hip (driving nail at top of hip and above birds mouth at corner pulling line between two points).
5. Demonstrate the procedures in laying out, calculating, cutting, and installing a hip rafter.

PERFORMANCE OBJECTIVE 78

CRITERION-REFERENCED MEASURE

Questions

1. The ridge on a hip roof is the length of the house minus twice the run plus the ____________ of the rafter.
2. The ____________ unit can be found by measuring the diagonal of a square. The sides are equal to the length of the unit.
3. The unit run for a hip rafter is ____________.

Answers

1. Thickness
2. Odd
3. 17"

Practical Application

Have students install a hip rafter to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 78 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 78 EVALUATION

INSTALLING HIP RAFTER

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Determined rafter specifications from plans.		
2. Calculated unit of rise and units of run.		
3. Calculated length of hip rafter with rafter tables.		
4. Established crown of straight stock.		
5. Laid out and marked side cuts of hip rafter with framing square.		
6. Laid out and marked plumb cuts of hip rafter.		
7. Measured and marked height of common rafter from seat cut to top of rafter.		
8. Transferred height of common rafter to hip rafter.		
9. Laid out bird's mouth on hip rafters.		
10. Subtracted drop of hip rafter from bird's mouth.		
11. Laid out projection of hip rafter.		
12. Cut hip rafter.		
13. Nailed rafter in place.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAME

PERFORMANCE OBJECTIVE 79

TASK

Install hip jack rafters

STANDARD OF PERFORMANCE OF TASK

Hip jack rafters must fit hip rafters in pairs with no gaps and must be spaced according to plans; top and ends of jacks must be aligned with common and hip rafters.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Common and hip rafters in place
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Identify the method of laying out a hip rafter.
3. Identify and use standard tool kit.

RESOURCE

Wagner. **Modern Carpentry**, pp. 210-212.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 210-212.
2. Have students use rafter table on framing squares to practice laying out side cuts.
3. Identify terms related to framing a hip roof.
4. Stress accuracy in layout and cutting and erecting hip jack rafters in pairs.
5. Demonstrate the steps in calculating length, laying out and cutting a hip jack rafter.

PERFORMANCE OBJECTIVE 79

CRITERION-REFERENCED MEASURE

Questions

1. When equally spaced along plate the change in length of jack rafters is always the same. This consistant change is called ________ difference.
2. Hip jack rafters run __________ to common rafters.
3. The unit rise for jack rafter is the same as a __________ rafter.

Answers

1. Common
2. Parallel
3. Common

Practical Application

Have students install hip jack rafters to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 79 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 79 EVALUATION

INSTALLING HIP JACK RAFTERS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Determined rafter specifications and spacing from plans.		
2. Calculated unit of rise from common rafters.		
3. Calculated common difference in length of jacks from rafter tables.		
4. Established crown of straight stock.		
5. Laid out and marked side cuts for jacks on edge of rafter.		
6. Subtracted one half of 45° thickness of hip rafter from jack rafter.		
7. Squared line across rafter and marked center point.		
8. Laid out and marked seat cut and projection from common rafter.		
9. Measured and cut first jack rafter pair.		
10. Subtracted common difference of first jack rafter pair to second jack rafter pair.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 79 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
11. Laid out, marked, and cut remaining jack rafter pairs according to method in item 10.		
12. Nailed jacks to hips in pairs. (NOTE: Do not bow hip rafters.)		
13. Checked alignment of jack rafters with common and hip rafters.		

APPROVED: YES _____ NO _____

Evaluator's Signature Date

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 80

TASK

Install valley rafter

STANDARD OF PERFORMANCE OF TASK

Valley rafter must fit between ridge, base, and common rafters with no gaps; top of common rafters and center of valley must be aligned; end of valley rafter projection must be aligned with common and/or hip rafters; and rafter must be nailed in place.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Common and/or hip rafters in place
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Identify the method of laying out a valley rafter.
3. Identify and use standard tool kit.

RESOURCE

Wagner. **Modern Carpentry**, pp. 207-210.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 207-210.
2. Review basic terminologies pertaining to roof framing, and the use of a framing square in roof framing.
3. Explain the need for selecting good straight stock. Because of weight factor, the valley rafter needs to be of larger stock than common rafters.
4. Stress accuracy in layout, cutting and fitting.
5. Demonstrate the steps in calculating length, laying out and cutting a valley rafter.

PERFORMANCE OBJECTIVE 80

CRITERION-REFERENCED MEASURE

Questions

1. Finding the length of overhang for a valley rafter is the same as finding the length of the overhang for a ____________ rafter.
2. The unit run for a valley rafter is ____________.
3. Hip and valley rafters must be shortened for the ridge by a distance equal to half of a ________ degree.

Answers

1. Hip
2. 17"
3. 45

Practical Application

Have students install a valley rafter to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 80 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 80 EVALUATION

INSTALLING VALLEY RAFTER

Student's Name Date

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Determined rafter specifications from plans.		
2. Calculated unit of rise and units of run from common and/or hip rafters.		
3. Calculated length of valley rafter from rafter tables.		
4. Established crown of straight stock.		
5. Laid out and marked side cuts of top of rafter valley.		
6. Subtracted one half of 45° thickness of ridgeboard from side cut of valley rafters.		
7. Laid out and marked top plumb cut of valley rafter.		
8. Measured height of common rafter from seat cut to top of common rafter.		
9. Transferred common rafter height to valley rafter.		
10. Laid out and marked bird's mouth cut for plate.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 80 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
11. Laid out and marked valley rafter tail to match common rafter tails.		
12. Measured and cut valley rafter.		
13. Nailed valley rafter in place.		
14. Checked valley rafter alignment with top and ends of common and/or hip rafters.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 81

TASK

Install valley jack rafters

STANDARD OF PERFORMANCE OF TASK

Longest valley jack rafter must be same as common rafter except for side cut at bottom; joining surfaces on side cuts must fit together tightly; and hip and valley rafter must not be bowed.

SOURCE OF STANDARD

Modern Carpentry, p. 269.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Common rafter pattern
Nails
Plans and specifications
Ridgeboard in place
Straight stock
Valley rafter in place

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Identify the method of laying out a valley jack rafter.
3. Identify and use standard tool kit.

RESOURCE

Wagner. **Modern Carpentry,** pp. 212-214.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 212-214.
2. Review basic terminology pertaining to roof framing, and the use of a framing square in roof framing.
3. Instruct students how to use a dry line to line up a valley rafter.
4. Stress accuracy in layout, cutting and erecting in pairs to keep valley straight.
5. Demonstrate the steps in calculating length, laying out and cutting valley jack rafter.

PERFORMANCE OBJECTIVE 81

CRITERION-REFERENCED MEASURE

Questions

1. The largest valley jack rafter is like a common rafter except for a ____________ or angle cut at the bottom.
2. Lay out and cut valley jack rafters in ____________ in the same way as hip jacks.
3. The top cut that fits to ridge will be a ____________ cut.

Answers

1. Side
2. Pairs
3. Plumb

Practical Application

Have students install a valley jack rafter to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 81 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 81 EVALUATION

INSTALLING VALLEY JACK RAFTERS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Determined rafter specifications from plans.		
2. Calculated unit of rise from common rafters.		
3. Calculated common difference and length of jacks from rafter tables.		
4. Established crown of straight stock.		
5. Laid out and marked side cuts for jacks on edge of rafter.		
6. Subtracted one half of 45° thickness of valley rafter from jack rafter.		
7. Laid out and marked top cut from common rafter.		
8. Measured and cut first jack rafter pair.		
9. Subtracted common difference from first jack rafter pair.		
10. Laid out, marked, and cut remaining jack rafter pairs.		
11. Nailed jacks to valleys in pairs.		
12. Checked alignment of valley jack rafter with common and valley rafters.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 82

TASK

Install gambrel roof rafters

STANDARD OF PERFORMANCE OF TASK

Primary and secondary rafters must fit double plate, support purlin, and ridge with no gaps; and ends of primary and secondary rafters must meet on semicircle.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Double plate in place
Plans and specifications
Straight stock
Subfloor

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Identify terms that are basic in roof framing.
3. Measure and lay out accurately.
4. Identify and use standard tool kit.

RESOURCE

Wagner. **Modern Carpentry**, pp. 217-219.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 217-219.
2. Instruct students in the use of framing square to make all cuts.
3. Stress accuracy in layout, cutting, and fitting the two sets of rafters in one side of a gambrel roof.
4. Have students make a full size drawing of one-half of a gambrel roof on the floor.
5. Demonstrate the steps in calculating length, laying out, and cutting a gambrel roof.

PERFORMANCE OBJECTIVE 82

CRITERION-REFERENCED MEASURE

Questions

1. The gambrel roof is often used in ___________ story construction.
2. To lay out a semicircle for a gambrel roof one-half of the ___________ is used.
3. The architectural style of a gambrel roof is commonly called ___________ ___________.

Answers

1. Two
2. Span
3. Dutch colonial

Practical Application

Have students install gambrel roof rafters to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 82 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 82 EVALUATION

INSTALLING GAMBREL ROOF RAFTERS

Student's Name **Date**

DIRECTIONS TO STUDENT — Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR — Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications for height of primary rafter.		
2. Laid out and marked semicircle on subfloor surface using one half of building span as radius.		
3. Established crown of straight stock.		
4. Laid out bottom and top cuts of primary rafters.		
5. Cut bottom and top cuts of primary rafters.		
6. Nailed primary rafters to double plate and support purlin.		
7. Braced primary rafters.		
8. Measured length of secondary rafters from top of semicircle to top of support purlin.		
9. Laid out bird's mouth and top cuts of secondary rafters.		
10. Cut secondary rafters.		
11. Nailed secondary rafters to support purlins and ridgeboard.		
12. Checked ends of primary and secondary rafters against semicircle.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

PERFORMANCE OBJECTIVE 83

TASK

Frame dormer without sidewalls

STANDARD OF PERFORMANCE OF TASK

Size and location of dormer must be as specified on plans; and dormers must have upper and lower headers set at right angles to roof slope.

SOURCE OF STANDARD

Residential Carpentry, p. 264.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Main roof in place
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Measure and lay out accurately.
3. Identify and use standard tool kit.

RESOURCE

Love. **Construction Manual, Rough Carpentry**, pp. 203-204.

TEACHING ACTIVITIES

1. Have students read and discuss **Rough Carpentry**, pp. 203-204.
2. Stress accuracy in lay out, cutting and fitting.
3. Instruct students in the use of framing square in making cuts.
4. Identify terms basic in roof framing.
5. Demonstrate the steps in laying out, cutting, and erecting a dormer without side walls.

PERFORMANCE OBJECTIVE 83

CRITERION-REFERENCED MEASURE

Questions

1. When the dormer roof is a different pitch than the main roof pitch it is a(n) ____________ pitch.
2. Small dormers can be framed on ____________ surface of the main roof.
3. Dormers built on the main roof can be __________ to aid in air circulation.

Answers

1. Unusual
2. Sheathed
3. Ventilation

Practical Application

Have students frame a dormer without sidewalls to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 83 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 83 EVALUATION

FRAMING A DORMER WITHOUT SIDEWALLS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans for width and length of dormer opening.		
2. Framed roof opening.		
3. Marked center line of dormer ridge and width of ridgeboard on upper header.		
4. Reversed plumb cut on end of ridgeboard at header.		
5. Trimmed other end of ridgeboard to fit.		
6. Marked rafter locations on ridgeboard.		
7. Calculated length of end rafters using unit rise and run of common rafters in main roof.		
8. Established crown of straight stock.		
9. Plumb cut end rafters at ridge.		
10. Beveled heel cut end rafters at header.		
11. Fitted and nailed end rafters to ridgeboard.		
12. Toenailed dormer assembly to headers.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 83 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
13. Calculated length of valley rafters.		
14. Subtracted one half thickness of ridgeboard from valley rafters.		
15. Nailed main roof valley jack rafters.		
16. Checked cut of valley rafters.		
17. Nailed valley rafters into ridgeboard in pairs.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 84

TASK

Frame dormer with sidewalls

STANDARD OF PERFORMANCE OF TASK

Size and location of dormer must be as specified on plans; dormers must have upper headers set at right angles to slope and lower headers must be plumb.

SOURCE OF STANDARD

Residential Carpentry, p. 264.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Main roof in place
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Measure and layout accurately.
3. Identify and use standard tool kit.

RESOURCE

Wagner. **Modern Carpentry**, pp. 216-217.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 216-217.
2. Review basic terminology pertaining to roof framing and the use of a framing square in roof framing.
3. Identify all terms basic in roof framing.
4. Stress accuracy in layout, cutting, and fitting.
5. Demonstrate the steps in the performance of laying out, cutting, and erecting a gable dormer.

PERFORMANCE OBJECTIVE 84

CRITERION-REFERENCED MEASURE

Questions

1. Gable dormers provide openings for ___________ located any where between plate and ridge.
2. A framed structure projecting above a sloping roof is a ___________.
3. A shed dormer ___________ is not limited by its roof style.

Answers

1. Windows
2. Dormer
3. Width

Practical Application

Have students frame a dormer with sidewalls to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 84 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 84 EVALUATION

FRAMING DORMER WITH SIDEWALLS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	**Unsatisfactory**
1. Checked plans for width and length of dormer opening.		
2. Framed roof opening.		
3. Calculated length of corner posts using plans.		
4. Measured, marked and cut corner posts.		
5. Beveled lower ends of corner posts to slope of main roof.		
6. Nailed posts plumb.		
7. Measured, marked, and cut top plate.		
8. Nailed top plate across posts.		
9. Marked locations of dormer studs on doubled rafters and on top plate and double header.		
10. Measured, marked, and cut dormer studs.		
11. Measured, marked, and cut side rafter plate.		
12. Beveled one end of rafter plate to slope of main roof.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 84 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
13. Nailed side rafter plates and dormer studs.		
14. Measured and cut cap plate.		
15. Nailed cap plate.		
16. Established crown of straight stock.		
17. Measured, marked, and cut ridgeboard and two end rafters.		
18. Assembled ridgeboard and two end rafters.		
19. Heeled cut rafters.		
20. Calculated length of valley rafters and shape of cut at lower ends.		
21. Measured, marked, and cut valley rafters.		
22. Nailed valley rafters.		
23. Measured, marked, and cut common rafters.		
24. Nailed common rafters in pairs.		
25. Measured, marked, and cut valley jack rafters.		
26. Nailed valley jack rafters in pairs.		
27. Nailed main roof valley jack rafters.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 85

TASK

Frame roof saddle

STANDARD OF PERFORMANCE OF TASK

Saddle must meet plans and specifications with no protrusions and must be nailed into roof rafters.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Nails
Plans and specifications
Sheathed roof
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Measure and layout accurately.
3. Identify and use standard tool kit.

RESOURCE

Wagner. **Modern Carpentry**, pp. 241-242.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 241-242.
2. Review tables on framing square for valley cuts.
3. Explain to students that small saddles need no framing. Large saddles must be framed.
4. Identify terms basic to roof framing.
5. Demonstrate the steps in laying out and cutting a roof saddle.

PERFORMANCE OBJECTIVE 85

CRITERION-REFERENCED MEASURE

Questions

1. Small saddles need no ____________ they can be cut from 3/4 inch exterior plywood.
2. To divert the flow of water and stop snow and ice from building up behind chimney a ____________ is used.
3. A saddle roof ____________ or pitch should be the same as the main roof.

Answers

1. Framing
2. Saddle
3. Slope

Practical Application

Have students frame a roof saddle to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 85 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 85 EVALUATION

FRAMING ROOF SADDLE

Student's Name Date

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for saddle placement.		
2. Determined width of saddle from plan.		
3. Measured length of ridgeboard.		
4. Cut ridgeboard to length with angle cut allowing angle to rest on present roof.		
5. Measured and cut valley strips.		
6. Calculated rafter lengths and angles.		
7. Laid out, marked, and cut rafters to length.		
8. Nailed ridge, saddle rafters, and valley strips together on ground.		
9. Lifted assembly into place.		
10. Nailed through valley strips into original roof rafters.		

APPROVED: YES _____ NO ____

Evaluator's Signature Date

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 86

TASK

Frame snub gable

STANDARD OF PERFORMANCE OF TASK

Snub gable pitch, location, and dimensions must be as specified on plans.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Framed surface
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Identify terms that are basic in roof framing.
3. Identify and use standard tool kit.

RESOURCE

Love. **Construction Manual, Rough Carpentry**, pp. 200-202.

TEACHING ACTIVITIES

1. Have students read and discuss **Construction Manual, Rough Carpentry**, pp. 200-202.
2. Lecture on the use of a rafter table on the framing square in laying out a rafter.
3. Select straight stock and recognize crown in stock.
4. Explain the step off method in laying out a hip and common rafter.
5. Demonstrate the steps in laying out and cutting rafters for a snub gable.

PERFORMANCE OBJECTIVE 86

CRITERION-REFERENCED MEASURE

Questions

1. A snub gable is two or more shortened ___________ rafters resting on a level plate.
2. The run of the snub hip rafter will be one half of the ___________ of the gable plate.
3. A ___________ cut must be made on both shortened common rafters.

Answers

1. Common
2. Span
3. Miter

Practical Application

Have students to construct a snub gable to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 86 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 86 EVALUATION

FRAMING A SNUB GABLE

Student's Name Date

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for gable placement.		
2. Determined ridge length from plan.		
3. Measured, marked,, and cut ridge length.		
4. Laid out, marked, and cut common rafters beginning with shortest or longest stud in gable.		
5. Measured, marked, and cut studs for gable end.		
6. Measured, marked, and cut plates for gable end.		
7. Assembled gable end on ground.		
8. Tacked gable end temporarily in position.		
9. Plumbed gable end.		
10. Braced gable end.		
11. Positioned ridge and nailed common rafters.		
12. Measured, marked, and cut snub hip rafters.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 86 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
13. Nailed snub hip rafters.		
14. Measured, marked, and cut jack rafters.		
15. Nailed jack rafters.		
16. Measured, marked, and cut snub cripple jack rafters.		
17. Nailed snub cripple jack rafters.		
18. Nailed gable end permanently in position.		

APPROVED: YES _____ NO _____

Evaluator's Signature Date

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 87

TASK

Install gable studs

STANDARD OF PERFORMANCE OF TASK

Top cuts of gable studs must fit tightly against rafters; studs must have same slope as roof and must be plumb and according to plans and specifications.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Nails
Plans and specifications
Portable circular saw
Straight stock
T-bench
Double plate in place

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Identify and use standard tool kit.
3. Measure and lay out accurately.

RESOURCE

Wagner. **Modern Carpentry**, pp. 206-207.

TEACHING ACTIVITIES

1. Have students read and discuss **Modern Carpentry**, pp. 206-207.
2. Discuss openings for vents, windows, and fans that are framed in gables.
3. Explain the term common difference, and show students where table is on framing square.
4. Identify terms: square, plumb, spacing, run, rise.
5. Demonstrate the steps in laying out and cutting gable studs.

PERFORMANCE OBJECTIVE 87

CRITERION-REFERENCED MEASURE

Questions

1. Gable studs can be measured and cut in ____________.
2. When nailing gable studs do not drive studs too tightly for this could ____________ gable rafter.
3. The distance between two lengths of gable studs is the ____________ difference.

Answers

1. Pairs
2. Crown
3. Common

Practical Application

Have students install gable studs to standard specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 87 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 87 EVALUATION

INSTALLING GABLE STUDS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Squared line across end wall double plate directly below center of gable.		
3. Measured half of window or louver opening size on each side of center line and marked location for first two studs.		
4. Laid out spacing for all studs according to plans and specifications.		
5. Cut and installed two full-length studs.		
6. Plumbed and marked length of all shorter studs.		
7. Cut studs.		
8. Nailed studs flush with outside of plates and rafters.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 88

TASK

Construct intersecting gable roof

STANDARD OF PERFORMANCE OF TASK

Rafter spacing, dimensions, and intersections must be as specified on plans.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Nails
Plans and specifications
Straight stock
Double plate in place

ENABLING OBJECTIVES

1. Identify basic hand and power tools.
2. Read and interpret plans and specifications.
3. Identify the procedure for rafter layout.

RESOURCE

Feirer, et al. **Carpentry and Building Construction**, Units 30 and 31, pp. 430-451.

TEACHING ACTIVITIES

1. Discuss five basic roof styles for homes and small buildings.
2. Take tour of campus and identify various roof styles.
3. Demonstrate proper layout with framing square to make top and bottom cuts for hip or valley rafters.
4. Have the students describe the layout of roof rafters to form an intersecting gable roof.
5. Instruct students to list the materials to erect a gable roof for a 20' x 48' house.

PERFORMANCE OBJECTIVE 88

CRITERION-REFERENCED MEASURE

Questions

1. The total rise of hip and valley rafters is ___________ as that of common rafters.
2. When making a cut for a hip or valley rafter ___________ is the number used on the body of the framing square .
3. In a right triangle, the ___________ is the side opposite the 90° angle.

Answers

1. The same
2. 17 inches
3. Hypotenuse

Practical Application

Have students construct a structurally sound intersecting gable roof, from a set of plans, using various tools.

Method of Evaluating Practical Application

Use Checklist Performance Objective 88 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 88 EVALUATION

CONSTRUCTING AN INTERSECTING GABLE ROOF

Student's Name Date

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans for rafter spacing for main roof.		
2. Established crown of straight stock.		
3. Laid out common rafters for main roof.		
4. Cut common rafters for main roof.		
5. Measured, marked, and cut ridgeboard for main roof.		
6. Measured, marked, and cut ridgeboard for intersecting roof.		
7. Laid out common rafters for intersecting roof.		
8. Cut common rafters for intersecting roof.		
9. Set end rafters and nailed ridgeboard for main roof.		
10. Located point of intersection on plans.		
11. Set intersecting common rafters in place and nailed to intersecting ridgeboard.		
12. Laid out valley rafters.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 88 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
13. Measured, marked, and cut valley rafters.		
14. Nailed valley rafters.		
15. Laid out valley jack rafters.		
16. Measured, marked, and cut valley jack rafters.		
17. Nailed valley jack rafters.		

APPROVED: YES _____ NO ____

Evaluator's Signature Date

DUTY INSTALLING ROUGH FRAMING

PERFORMANCE OBJECTIVE 89

TASK

Install roof sheathing

STANDARD OF PERFORMANCE OF TASK

Ends of roof sheathing must be centered on rafters; joints must be nailed every 4 to 6 inches; remainder of each sheet must be nailed into the rafters every 8 to 10 inches; and sheathing must be laid with face grain perpendicular to rafters.

SOURCE OF STANDARD

Modern Carpentry, p. 181.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Framed roof
Ladder
Nails
Plywood sheathing
Scafford

ENABLING OBJECTIVES

1. Identify proper tools and fasteners needed.
2. Follow safety precautions for roofing.

RESOURCE

Feirer, et al. **Carpentry and Building Construction**, Unit 34, pp. 500-515.

TEACHING ACTIVITIES

1. Discuss closed and open sheathing installation using lumber.
2. Demonstrate installation of plywood sheathing.
3. Have the students discuss the need for plyclips.
4. Have the students list various lumber decking span arrangements.
5. Explain the advantages of plywood roof sheathing over lumber roof sheathing.

PERFORMANCE OBJECTIVE 89

CRITERION-REFERENCED MEASURE

Questions

1. The most commonly used sheathing for pitched roofs is ___________ or ___________.
2. The minimum thickness of plywood sheathing under asphalt shingles with a rafter spacing of 16" is ___________.
3. The grain of plywood sheathing should be at ___________ ___________ to the supporting members.

Answers

1. Plywood, lumber
2. 5/16 inch
3. Right angles

Practical Application

Have students install two types of roof sheathing; laying with face grain perpendicular to rafters.

Method of Evaluating Practical Application

Use Checklist Performance Objective 89 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 89 EVALUATION

INSTALLING ROOF SHEATHING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	**Unsatisfactory**
1. Checked roof frame construction and nailing patterns.		
2. Erected scaffold.		
3. Measured and struck chalk line 4 feet up from end of rafters at each end of roof.		
4. Laid top of first row of sheathing on chalk line.		
5. Centered end joints on rafter.		
6. Nailed sheathing into rafters.		
7. Cut half sheet for second row.		
8. Nailed second row, breaking joints.		
9. Continued procedure until roof is sheathed.		
10. Cut excess sheathing along hips.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

INSTALLING ROOF COMPONENTS

DUTY INSTALLING ROOF COMPONENTS

PERFORMANCE OBJECTIVE 90

TASK

Install roofing felt

STANDARD OF PERFORMANCE OF TASK

Felt must be tight, with 2 inch lap at horizontal joints, and 4 inch lap at end joints, and nailed every 16 to 24 inches across top, every 12 inches across middle, and every 4 inches across sides and bottom.

SOURCE OF STANDARD

Modern Carpentry, p. 189.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Galvanized roofing nails
Ladder
Plans and specifications
Roofing felt
Sheathed roof

ENABLING OBJECTIVES

1. Identify 15# and 30# felt.
2. Read and interpret plans and specifications on roofing.

RESOURCE

Feirer, et al. **Carpentry and Building Construction,** Unit 35, pp. 517-520.

TEACHING ACTIVITIES

1. Discuss general purposes for roof underlayment.
2. Explain why there must be a minimum slope of 4 on 12 for shingles.
3. Have students discuss why the underlayment can not act as a vapor barrier.
4. Demonstrate proper installation of roofing felt.
5. Have the students explain proper nailing procedures.

PERFORMANCE OBJECTIVE 90

CRITERION-REFERENCED MEASURE

Questions

1. Underlayment should have __________ toplap and __________ sidelap.
2. Underlayment should be a material with low vapor resistance, such as ____________, ____________, ____________.
3. Lap the roof felt over all hips and ridges __________ on each side.

Answers

1. 2", 4"
2. Asphalt saturated felt
3. 6"

Practical Application

Have students install roofing felt that is tight with 2" toplap and 4" sidelap.

Method of Evaluating Practical Application

Use Checklist Performance Objective 90 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 90 EVALUATION

INSTALLING ROOFING FELT

Student's Name Date

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for size and weight of felt paper.		
2. Inspected sheathing for complete nailing patterns and protruding nails.		
3. Hammered any protruding nails into sheathing.		
4. Cleaned sheathing of foreign materials.		
5. Measured, cut, and rolled roofing felt to length of roof working from bottom to top on all roof surfaces.		
6. Rolled felt across edge of roof allowing 1 inch overhang at lower edge.		
7. Nailed every 16 to 24 inches across top.		
8. Nailed every 12 inches across middle.		
9. Nailed every 4 inches across sides and bottom.		
10. Rolled subsequent rows with 2 to 4 inch overlap.		
11. Measured, cut, rolled, and nailed remaining felt.		
12. Overlapped peaks.		

APPROVED: YES _____ NO ____

Evaluator's Signature Date

DUTY INSTALLING ROOF COMPONENTS

PERFORMANCE OBJECTIVE 91

TASK

Install chimney flashing

STANDARD OF PERFORMANCE OF TASK

Flashing must extend 5 inches up chimney face, 5 inches down onto shingles, and 4 inches beyond chimney sides. Flashing must be secured with galvanized metal wedges and all joints where flashing meets masonry must be sealed.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Flashing
Galvanized metal wedges
Ladder
Plans and specifications
Sealant
Sheathed roof

ENABLING OBJECTIVES

1. Identify tools needed for task.
2. Identify flashing material.

RESOURCE

Feirer, et al., **Carpentry and Building Construction**, Unit 35, p. 524 and Fig. 35-18.

TEACHING ACTIVITIES

1. Discuss reasons for using flashing.
2. Demonstrate how to make flashing water tight and water-shedding.
3. Describe the type of metal recommended for flashing.
4. Have the students list several places where flashing is required.
5. Have the students describe the proper installation of chimney flashing.

PERFORMANCE OBJECTIVE 91

CRITERION-REFERENCED MEASURE

Questions

1. The roll roofing should be cut to run __________ up the chimney.
2. Metal flashing around the chimney is held in place by inserting it into the __________ __________.
3. Three types of metals used for flashing are __________ __________, __________, and ______________.

Answers

1. 10"
2. Mortar joints
3. Galvanized steel, aluminum, and copper.

Practical Application

Have students install chimney flashing that extends 5" up chimney face, 5" down onto shingles, and 4" beyond chimney sides.

Method of Evaluating Practical Application

Use Checklist Performance Objective 91 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 91 EVALUATION

INSTALLING CHIMNEY FLASHING

Student's Name Date

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Cut and bent base flashing for front face of chimney so that flashing extends down onto shingles at least 5 inches, up chimney at least 5 inches, and beyond chimney sides at least 4 inches.		
3. Cut step flashing in 8 inch squares for chimney sides.		
4. Bent step flashing at right angles so that 5 inches extends up chimney face and 3 inches extended onto roof deck.		
5. Installed base flashing on front face of chimney bending extensions around corners.		
6. Installed individual step flashing squares along both sides of chimney as roofing shingles were laid.		
7. Bent flashing to fit around lower corners of chimney.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 91 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
8. Cut and bent counter flashing for lower face of chimney from one piece of flashing, allowing extra metal to be bent around sides of chimeny.		
9. Inserted counter flashing into mortar joint.		
10. Secured with metal wedges.		
11. Cut and bent counter flashing for sides of chimney to follow roof slope.		
12. Inserted upper edge of flashing into mortar joint and secured with metal wedges.		
13. Continued to install counter flashing up sides and across back of chimney.		
14. Sealed joints where flashing met masonry.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

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DUTY INSTALLING ROOF COMPONENTS

PERFORMANCE OBJECTIVE 92

TASK

Install valley flashing

STANDARD OF PERFORMANCE OF TASK

Flashing must be flush to surface and without nail holes.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Aluminum roll flashing
Ladder
Metal brake
Plans and specifications
Galvanized roofing nails
Sealant
Tin snips

ENABLING OBJECTIVES

1. Identify materials used for flashing.
2. Read and interpret plans and specifications.

RESOURCE

Feirer, et al. **Carpentry and Building Construction,** Unit 35, pp. 520-524.

TEACHING ACTIVITIES

1. Discuss the open and closed methods used to construct valley flashing.
2. Demonstrate the open method on model valley.
3. Demonstrate the closed method on model valley.
4. Have students describe the main difference between open and closed valley flashing.
5. List the advantages of the closed system over the open system.

PERFORMANCE OBJECTIVE 92

CRITERION-REFERENCED MEASURE

Questions

1. Before shingles are applied in the open valley system, a ___________ ___________ is snapped on each side of the valley for its full length.
2. Closed valleys can be used only with ___________ shingles.
3. Open valleys may be flashed with ___________ or ___________ roll roofing.

Answers

1. Chalked line
2. Strip
3. Metal or asphalt

Practical Application

Have students install valley flashing that must be flush to surface and without nail holes.

Method of Evaluating Practical Application

Use Checklist Performance Objective 92 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 92 EVALUATION

INSTALLING VALLEY FLASHING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Struck chalk line half width of flashing from center of valley.		
2. Measured and cut flashing to valley length including overlap.		
3. Broke flashing at half width.		
4. Set flashing and aligned edge with chalk line.		
5. Nailed along edges. (CAUTION: Nail heads must not pierce flashing.)		
6. Folded flashing over ridge. (NOTE: Join strips by overlapping 12 inches and securing with asphalt cement.)		
7. Sealed edges.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROOF COMPONENTS

PERFORMANCE OBJECTIVE 93

TASK

Install composite strip shingles

STANDARD OF PERFORMANCE OF TASK

Shingles must be flush to surface with shingle pattern and nailing pattern complete according to manufacturer's specifications.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Composite strip shingles
Galvanized roofing nails
Ladder
Manufacturer's specifications
Sheathed and flashed roof

ENABLING OBJECTIVES

1. Identify materials used in strip shingle installation.
2. Read manufacturer's specifications.

RESOURCE

Feirer, et al. **Carpentry and Building Construction**, Unit 35, pp. 527-531.

TEACHING ACTIVITIES

1. Discuss the three basic kinds of asphalt roof shingles.
2. List the steps in roof construction that must be complete before applying shingles.
3. Explain why a starter strip is necessary.
4. Have students explain additional protection required for shingles in windy areas.
5. Demonstrate nail placement on three-tab square butt shingles.

PERFORMANCE OBJECTIVE 93

CRITERION-REFERENCED MEASURE

Questions

1. Nails for applying asphalt roofing should be ___________.
2. One square of shingles will cover ___________.
3. To prevent buckling be sure each shingle is in ___________ ___________ before driving any nail.

Answers

1. Corrosion - resistant.
2. 100 sq. ft.
3. Perfect alignment

Practical Application

Have students install composite strip shingles that must be flush to surface with shingle and nailing patterns complete.

Method of Evaluating Practical Application

Use Checklist Performance Objective 93 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 93 EVALUATION

INSTALLING COMPOSITE STRIP SHINGLES

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Struck chalk line 1 inch less than width of shingles from height.		
2. Struck subsequent parallel chalk lines on weather exposed area.		
3. Struck vertical chalk lines according to manufacturer's specifications allowing for 1 inch overhang.		
4. Positioned and nailed starter shingle according to manufacturer's specifications.		
5. Continued nailing as specified until first row is complete.		
6. Cut first shingle for second row according to manufacturer's specifications.		
7. Butted and nailed as specified, subsequent shingles to side of each preceding shingle until row was complete.		
8. Alternated first shingle for each subsequent row at each vertical chalk line according to manufacturer's specifcations.		
9. Installed subsequent rows along parallel lines until roof was complete.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROOF COMPONENTS

PERFORMANCE OBJECTIVE 94

TASK

Install composite shingles on ridge cap

STANDARD OF PERFORMANCE OF TASK

Ridge cap must be straight and overlapped equally on each side of ridges; and all exposed nails must be covered with sealant.

SOURCE OF STANDARD

Modern Carpentry, p. 196.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Composite strip shingles
Galvanized roofing nails
Ladder
Manufacturer's specifications
Sealant
Sheathed and flashed roof

ENABLING OBJECTIVES

1. Identify materials used in strip shingle installations.
2. Read manufacturer's specifications.

RESOURCE

Feirer, et al. **Carpentry and Building Construction**, Unit 35, pp. 532-533.

TEACHING ACTIVITIES

1. Discuss two methods of finishing hip and ridge shingles.
2. Have students explain how to make ridge shingles from square-butt shingles.
3. Demonstrate proper installation of ridge shingles.
4. Have students estimate number of ridge shingles needed for a 24 ft. ridge cap.
5. Explain how to decide which end of ridge cap to begin the shingles.

PERFORMANCE OBJECTIVE 94

CRITERION-REFERENCED MEASURE

Questions

1. Ridge shingles are to be cut at least ________ x ________.
2. What is the recommended exposure for ridge shingles?
3. Always lay the exposed edge ___________ from the prevailing winds.

Answers

1. 9" x 12"
2. 5"
3. Away

Practical Application

Have students install composite shingles on ridge cap that must be straight and overlapped equally on each side of ridges.

Method of Evaluating Practical Application

Use Checklist Performance Objective 94 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 94 EVALUATION

INSTALLING COMPOSITE SHINGLES ON RIDGE CAP

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Cut shingles into individual tabs. (NOTE: In cold weather, shingles should be warmed to prevent breakage.)		
2. Struck chalk lines according to manufacturer's specifications.		
3. Capped gable roof a. Positioned first shingle tab opposite weather side on edge of ridge. b. Nailed with two roofing nails above exposure line. c. Positioned next shingle tab along chalk line overlapping previous shingle leaving exposure stipulated in manufacturer's specifications. d. Nailed with two roofing nails above exposure line. e. Continued to position and nail shingles as specified until ridge was complete.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 94 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
4. Capped hip roof a. Positioned first shingle tab along chalk line at bottom of hip. b. Cut edges of first shingle to conform with roof. c. Nailed with two roofing nails above exposure line. d. Positioned next shingle tab along chalk line overlapping previous shingle according to manufacturer's specifications. e. Nailed with two roofing nails above exposure line. f. Continued to position and nail shingles as specified until hip was complete.		
5. Face nailed final shingle.		
6. Covered nailheads with sealant.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROOF COMPONENTS

PERFORMANCE OBJECTIVE 95

TASK

Install composite shingles in valley

STANDARD OF PERFORMANCE OF TASK

Shingle line must be straight, even, and parallel to valley; and shingles must be nailed according to manufacturer's specifications without piercing flashing.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Composite shingles
Flashed valley
Galvanized roofing nails
Ladder
Manufacturer's specifications
Straightedge

ENABLING OBJECTIVES

1. Identify materials used in composite shingle installation.
2. Read manufacturer's specifications.

RESOURCE

Feirer, et al., **Carpentry and Building Construction**, Unit 35, pp. 522-524.

TEACHING ACTIVITIES

1. Demonstrate the cutting procedure for shingles used in an open valley.
2. Demonstrate the lapping procedure for shingles used in a closed valley.
3. Have students discuss the advantages of a closed valley over an open valley.
4. Explain the use of asphalt cement.
5. Have students identify open and closed valley systems.

PERFORMANCE OBJECTIVE 95

CRITERION-REFERENCED MEASURE

Questions

1. The upper corner of each end shingle in an open valley is clipped to prevent ____________ ____________ between courses.
2. Closed valleys can be used only with ____________ ____________.
3. Valley shingles may be applied on both roof surfaces at the ____________ time.

Answers

1. Water penetration
2. Strip shingles
3. Same

Practical Application

Have students install composite shingles in valley that must be straight, even, and parallel to valley.

Method of Evaluating Practical Application

Use Checklist Performance Objective 95 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 95 EVALUATION

INSTALLING COMPOSITE SHINGLES IN VALLEY

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Struck chalk line 2 inches from center of flashed valley.		
2. Positioned shingle overlapping valley on lowest row.		
3. Marked top and bottom of shingle at chalk line.		
4. Cut shingle between marks using straightedge and utility knife.		
5. Repositioned shingle edge, aligned with chalk line and nailed according to manufacturer's specifications.		
6. Continued to cut and nail shingles in position, without nailing through flashing, according to manufacturer's specifications until valley was complete.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROOF COMPONENTS

PERFORMANCE OBJECTIVE 96

TASK

Install composite shingles around roof opening

STANDARD OF PERFORMANCE OF TASK

Shingles must be tight to roof opening; must not leak; and flashing must not be pierced with nails.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Composite strip shingles
Galvanized roofing nails
Manufacturer's specifications
Ladder
Roofing tar
Sheathed flashed roof
Step flashing

ENABLING OBJECTIVES

1. Select the materials needed to install composite shingles around roof opening.
2. Demonstrate ability to install composite shingles.

RESOURCE

Baker. **Carpentry Fundamentals**, pp. 192-194.

TEACHING ACTIVITIES

1. Read and discuss **Carpentry Fundamentals**, pp. 192-194.
2. Demonstrate how to install flashing.
3. Have a student measure the size of shingles needed.
4. Demonstrate how to cut the shingles to required size.
5. Demonstrate how to install composite shingles around a roof opening.

PERFORMANCE OBJECTIVE 96

CRITERION-REFERENCED MEASURE

Questions

1. Always be careful not to pierce the flashing with the ___________.
2. The shingles should be tight to the ___________.
3. The nails to be used should be ___________.

Answers

1. Nails
2. Roof
3. Galvanized

Practical Application

Have students install composite shingles around roof openings. The shingles must be tight to roof opening, must not leak, and flashing must not be pierced with nails.

Method of Evaluating Practical Application

Use Checklist Performance Objective 96 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 96 EVALUATION

INSTALLING COMPOSITE SHINGLES AROUND ROOF OPENINGS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Tucked last full row of shingles under flashing at bottom of roof opening.		
2. Measured distance from last full shingle of next row to opening.		
3. Cut shingle to measured length.		
4. Positioned shingle on roof and nailed without piercing flashing.		
5. Placed step flashing overlapping back of shingle.		
6. Nailed top and bottom corners of step flashing to roof without piercing flashing.		
7. Continued to cut and nail shingles in position along both sides of opening.		
8. Continued full row of shingles over top of opening.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROOF COMPONENTS

PERFORMANCE OBJECTIVE 97

TASK

Install shingles over dormer or roof appendage

STANDARD OF PERFORMANCE OF TASK

Shingles must meet above roof appendage completing the manufacturer's specified pattern.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Composite strip shingles
Galvanized roofing nails
Ladder
Manufacturer's specifications
Sheathed roof

ENABLING OBJECTIVES

1. Demonstrate skills of measuring, and of chalking straight lines.
2. Show ability to install shingles.

RESOURCE

Baker. **Carpentry Fundamentals**, pp. 196-200.

TEACHING ACTIVITIES

1. Read and discuss **Carpentry Fundamentals**, pp. 196-200.
2. Discuss the procedures for installing shingles over dormer or roof appendage.
3. Have the students list the ways to keep the shingles straight.
4. Assist the students in measuring and chalking roof for the installation of shingles.
5. Demonstrate how to install shingles over dormer or roof appendage.

PERFORMANCE OBJECTIVE 97

CRITERION-REFERENCED MEASURE

Questions

1. The shingles should be installed to meet the manufacturer's ___________.
2. A square of shingles covers ___________ square feet.
3. Use a chalk line to keep the shingles ___________.

Answers

1. Specified pattern
2. 100 square feet
3. Straight

Practical Application

Have students install shingles over dormer, or roof appendage. The shingles must meet above roof appendage completing the manufacturer's specified pattern.

Method of Evaluating Practical Application

Use Checklist Performance Objective 97 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 97 EVALUATION

INSTALLING SHINGLES OVER DORMER OR ROOF APPENDAGE

Student's Name Date

DIRECTIONS TO STUDENT	Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.
DIRECTIONS TO EVALUATOR	Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Shingled roof on one side of appendage.		
2. Extended chalk line from top shingle row across roof above appendage.		
3. Measured chalk line down to bottom edge of roof on other side of appendage in increments equal to intended exposed area.		
4. Measured across chalk line starting from last full shingle in increments equal to width of shingle.		
5. Chalked horizontal line at measured increment.		
6. Chalked vertical line at measured increment closest to appendage.		
7. Counted number of horizontal chalk lines, excluding extended line above appendage.		
8. Started bottom row at vertical chalk line if number of horizontal lines is even.		
9. Applied shingles starting at bottom horizontal offsetting according to manufacturer's specified pattern.		

APPROVED: YES _____ NO ____

Evaluator's Signature Date

DUTY INSTALLING ROOF COMPONENTS

PERFORMANCE OBJECTIVE 98

TASK

Install roof vent

STANDARD OF PERFORMANCE OF TASK

Roof vent must be installed according to plans and specifications and allow no water to enter; roofing cement must be applied around base of vent.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Galvanized roofing nails
Ladder
Plans and specifications
Roofing cement
Roof vent
Sheathed roof

ENABLING OBJECTIVES

1. Select materials needed to install roof vent.
2. Measure and mark the location for roof vent to be installed.

RESOURCE

Wagner. **Modern Carpentry**, pp. 242-243.

TEACHING ACTIVITIES

1. Read and discuss **Modern Carpentry**, pp. 242-243.
2. List the minimum flange requirements.
3. Express the importance of positioning the location of the cut.
4. Have a student cut the required size opening.
5. Demonstrate how to install roof vent.

PERFORMANCE OBJECTIVE 98

CRITERION-REFERENCED MEASURE

Questions

1. The flange should extend below the vent at least __________.
2. The flange should extend above the vent at least __________.
3. Roof cement should be applied ______________.

Answers

1. 4 inches
2. 8 inches
3. Around all edges of the flange

Practical Application

Have students install roof vent according to plans and specifications and allow no water to enter. Roof cement must be applied around base of the vent.

Method of Evaluating Practical Application

Use Checklist Performance Objective 98 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 98 EVALUATION

INSTALLING ROOF VENT

Student's Name **Date**

DIRECTIONS TO STUDENT — Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR — Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Cut opening in roof to size.		
3. Placed roof vent over opening.		
4. Drove two nails into top corners of vent flange without piercing vent flange with nailheads.		
5. Ran lower rows of shingles underneath bottom flange of vents.		
6. Nailed bottom corners of vent flange.		
7. Cut upper rows of shingles around vent with utility knife.		
8. Applied roof cement around all edges.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROOF COMPONENTS

PERFORMANCE OBJECTIVE 99

TASK

Install ridge vent

STANDARD OF PERFORMANCE OF TASK

Ridge vent must be aligned with ridge and must allow air to circulate in rafters.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
End caps
Galvanized roofing nails
Ladder
Manufacturer's specifications
Portable circular saw
Ridge vent
Sheathed and shingled roof
Slip connector

ENABLING OBJECTIVES

1. Read and interpret manufacturer's specifications.
2. Measure and cut accurately.
3. Use power saw.

RESOURCE

Watson. **Roofing Systems: Materials and Application,** pp. 47-48.

TEACHING ACTIVITIES

1. Read and discuss **Roofing Systems: Materials and Application,** pp. 47-48.
2. Discuss the materials and tools to be used in the installation of ridge vent.
3. Discuss and explain the preparation of the roof, for installing ridge vent.
4. Have a student prepare the roof for the installation of ridge vent.
5. Demonstrate how to install ridge vent.

PERFORMANCE OBJECTIVE 99

CRITERION-REFERENCED MEASURE

Questions

1. Ridge vents allow air to circulate in the ___________.
2. If trusses are not used you should use a ___________.
3. Ridge vents allow air to be exhausted by using ___________.

Answers

1. Rafters
2. 3/4 inch ridge board
3. Natural air currents and wind

Practical Application

Have students install ridge vent. It must be aligned with ridge and must allow air to circulate in rafters.

Method of Evaluating Practical Application

Use Checklist Performance Objective 99 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 99 EVALUATION

INSTALLING RIDGE VENT

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Removed shingles from ridge.		
2. Cut sheathing back 1 inch from each side of peak.		
3. Struck chalk line 3 inches from peak.		
4. Set ridge vent(s) along chalk line.		
5. Cut last ridge vent to length.		
6. Connected ridge vents with slip connector.		
7. Plugged ends of ridge vents with end caps.		
8. Nailed ridge vents according to manufacturer's specifications behind splash guard.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROOF COMPONENTS

PERFORMANCE OBJECTIVE 100

TASK

Install skylight

STANDARD OF PERFORMANCE OF TASK

Skylight must be aligned in opening, must not leak, and all flashing joints must be sealed.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Crosscut saw
Flashing
Framed roof
Galvanized roofing nails
Ladder
Plans and specifications
Sealant
Skylight with manufacturer's instructions
Straight stock

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Use standard tool kit.
3. Measure and cut accurately.

RESOURCE

Wagner. **Modern Carpentry**, p. 288.

TEACHING ACTIVITIES

1. Read and discuss **Modern Carpentry**, p. 288.
2. Discuss and review the purposes for installing skylights.
3. Show the students how to gather needed information from plans and specifications.
4. Illustrate how to measure, mark, and prepare the rough opening.
5. Have a student cut the rough opening.
6. Demonstrate how to install skylight.

PERFORMANCE OBJECTIVE 100

CRITERION-REFERENCED MEASURE

Questions

1. Skylights make a difference in the appearance and ____________.
2. Skylights allow rooms to be lighted by _______________.
3. Skylights allow you to convert attic space into ____________.

Answers

1. Feeling of a room
2. Natural light
3. Living space

Practical Application

Have students install skylight. It must be aligned in the opening, must not leak, and all flashing joints must be sealed.

Method of Evaluating Practical Application

Use Checklist Performance Objective 100 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 100 EVALUATION

INSTALLING SKYLIGHT

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications for skylight location.		
2. Cut rafters according to plans and specifications.		
3. Headed off rafters to desired rough opening. For unflashed skylight a. Built box curb with inside dimensions equal to rough opening if necessary. b. Toenailed curb to roof over opening. c. Flashed bottom, sides, and top of curb. d. Placed continuous bead of sealant around top perimeter of curb. e. Positioned skylight over curb. f. Attached skylight to curb according to manufacturer's instructions. For preflashed skylight a. Positioned and aligned skylight in rough opening. b. Attached skylight according to manufacturer's instructions.		
4. Sealed joints of flashing.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROOF COMPONENTS

PERFORMANCE OBJECTIVE 101

TASK

Install wood shingles/shakes

STANDARD OF PERFORMANCE OF TASK

Shingles must cover roof area with 1/4 inch spaces between; joints must be staggered and felt paper must be applied between each course.

SOURCE OF STANDARD

Residential Carpentry, p. 374.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Galvanized roofing nails
Ladder
Plans and specifications
Roofing felt
Sheathed flashed roof
Wood shingles/shakes

ENABLING OBJECTIVES

1. Use a standard tool kit.
2. Measure and mark accurately.

RESOURCE

Wagner. **Modern Carpentry**, pp. 253-256.

TEACHING ACTIVITIES

1. Read and discuss **Modern Carpentry**, pp. 253-256.
2. Discuss the materials to be used in installing wood shingle/shakes.
3. Review the different types of wood shingle/shakes.
4. Have the students list the maximum weather exposure for various sizes of wood shingle/shakes.
5. Demonstrate how to install wood shingle/shakes.

PERFORMANCE OBJECTIVE 101

CRITERION-REFERENCED MEASURE

Questions

1. Do not apply wood shingle/shakes to roofs that have too little __________.
2. The recommended minimum slope for wood shingle/shakes is __________.
3. The number of nails used in one wood shingle/shake is __________.

Answers

1. Slope
2. 4 in 12
3. Two

Practical Application

Have students install wood shingles/shakes. Shingles must cover roof area with 1/4 inch spaces between. Joints must be staggered and felt paper must be applied between each course.

Method of Evaluating Practical Application

Use Checklist Performance Objective 101 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 101 EVALUATION

INSTALLING WOOD SHINGLES/SHAKES

Student's Name Date

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Positioned first shingle of bottom row with 1 inch overhang at gutter and rake.		
3. Nailed shingle with two nails with nailheads just touching shingles. (NOTE: Do not countersink nails.)		
4. Positioned second shingle alongside first shingle with 1/4 inch gap between shingles and 1 inch overhang at gutter.		
5. Continued procedure until first row was completed.		
6. Nailed shingle with two nails.		
7. Installed second row directly over first row using same procedure making certain that joints between shingles were not over joints or nails of previous row.		
8. Struck chalk line across row of shingles at intended exposure.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 101 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
9. Rolled strip of felt paper across top of shingle row above exposure line.		
10. Installed next row of shingles along chalk line.		
11. Split last shingle in each course to roof edge.		
12. Continued procedure for subsequent rows until roof is completed.		

APPROVED: YES ____ NO ____

Evaluator's Signature Date

DUTY INSTALLING ROOF COMPONENTS

PERFORMANCE OBJECTIVE 102

TASK

Install wood shingles/shakes on ridge cap

STANDARD OF PERFORMANCE OF TASK

Shakes must be straight; overlapped equally on each side of ridge; must not leak; and all exposed nails must be covered with sealant.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Felt paper
Galvanized roofing nails
Ladder
Plans and specifications
Sealant
Sheathed flashed roof
Wood shingles/shakes

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Measure, mark, and cut accurately.
3. Use a power saw.

RESOURCE

Baker. **Carpentry Fundamentals**, pp. 207-208.

TEACHING ACTIVITIES

1. Read and discuss **Carpentry Fundamentals**, pp. 207-208.
2. Have the students locate the ridges on various roofs.
3. List the importance of keeping the ridge cap straight.
4. Review the materials needed to install wood shingle/shake ridge cap.
5. Demonstrate how to install wood shingle/shake ridge cap.

PERFORMANCE OBJECTIVE 102

CRITERION-REFERENCED MEASURE

Questions

1. One of the best ways to keep the ridge cap straight is to ___________.
2. The felt paper strap that you use under the ridge cap should be narrower than the chalk lines by ___________.
3. All exposed nails on the ridge cap should be ___________.

Answers

1. Strike a chalk line on each side of the ridge.
2. 2 inches
3. Covered with sealant.

Practical Application

Have students install wood shingle/shakes on ridge cap. Shakes must be straight, overlapped equally on each side of ridge, must not leak, and all exposed nails must be covered with sealant.

Method of Evaluating Practical Application

Use Checklist Performance Objective 102 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 102 EVALUATION

INSTALLING WOOD SHINGLE/SHAKES ON RIDGE CAP

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications.		
2. Struck chalk line on each side of ridge and peaks at intended shingle exposure.		
3. Cut strip of felt paper 2 inches narrower than distance between chalk lines.		
4. Overlapped ridge with felt paper.		
5. Capped gable roof. a. Set two shingles/shakes opposite of weather side of ridge. b. Measured and split shingles to fit distance between chalk line and ridge with grain in shingles following horizontal line. c. Nailed shingles in place. d. Continued procedure until ridge is complete.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 102 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
6. Capped hip roof. a. Set two shakes at bottom of hip ridge along chalk line. b. Measured and split first shingle to fit between chalk line and hip ridge. c. Cut bottom of first shingle to align with bottom edge of roof. d. Nailed shingles in place. e. Continued procedure until hip ridge is complete.		
7. Cut back final two shingles so that only exposure remains.		
8. Face nailed final two shingles.		
9. Covered nails with sealant.		

APPROVED: YES _____ NO ____

Evaluator's Signature Date

DUTY INSTALLING ROOF COMPONENTS

PERFORMANCE OBJECTIVE 103

TASK

Install wood shingles/shakes in valley

STANDARD OF PERFORMANCE OF TASK

Shingles must be straight and parallel to center of valley with no nails piercing valley flashing.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Galvanized roofing nails
Ladder
Roofing tar
Sheathed flashed valley
Wood shingles/shakes

ENABLING OBJECTIVES

1. Use a power saw.
2. Know roof terminology.
3. Measure, mark, and cut accurately.

RESOURCE

Baker. **Carpentry Fundamentals**, pp. 206-207.

TEACHING ACTIVITIES

1. Read and discuss **Carpentry Fundamentals**, pp. 206-207.
2. Discuss the materials to be used for installing wood shingle/shakes in valleys.
3. Demonstrate how to prepare a valley for installing wood shingle/shakes.
4. Have a student prepare a valley for installing wood shingle/shakes.
5. Demonstrate how to install wood shingle/shakes in valleys.

PERFORMANCE OBJECTIVE 103

CRITERION-REFERENCED MEASURE

Questions

1. If the roof pitch is less than 12 in 12 the valley sheets should ___________.
2. If the roof pitch is greater than 12 in 12 the valley sheets should ___________.
3. Most leaks occur where water is ___________.

Answers

1. Extend 10 inches on both sides of the valley.
2. Extend 7 inches on both sides of the valley.
3. Channeled for running off the roof.

Practical Application

Have students install wood shingle/shakes in valley. They should be straight and parallel to the center of the valley with no nails piercing valley flashing.

Method of Evaluating Practical Application

Use Checklist Performance Objective 103 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 103 EVALUATION

INSTALLING WOOD SHINGLE/SHAKES IN VALLEY

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Struck chalk line 2 inches from center of valley.		
2. Positioned shingle at bottom row overlapping valley.		
3. Marked shingle at top and bottom of chalk line.		
4. Cut shingle along chalk line.		
5. Repositioned shingle and nailed with two nails. (NOTE: Do not nail through flashing. If shingle has no space for nailing without flashing beneath, fasten shingle with roofing tar.)		
6. Continued procedure until valley is shingled.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING ROOF COMPONENTS

PERFORMANCE OBJECTIVE 104

TASK

Install wood shingles/shakes around roof opening

STANDARD OF PERFORMANCE OF TASK

Shingles must be tight to roof opening and must not leak; and exposed nails must be covered with sealant.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Galvanized roofing nails
Ladder
Sealant
Sheathed flashed roof
Step flashing
Wood shingles/shakes

ENABLING OBJECTIVES

1. Measure, mark, and cut accurately.
2. Safely use a ladder.

RESOURCE

Watson. **Roofing Systems: Materials and Application**, pp. 89-90.

TEACHING ACTIVITIES

1. Read and discuss **Roofing Systems: Materials and Application**, pp. 89-90.
2. Have the students list what roof openings are and what they are for.
3. Describe the necessity of using flashing around roof openings.
4. Compare installing wood shingle shakes around opening to other types of roofing around roof opening.
5. Demonstrate how to install wood shingle shakes around roof opening.
6. Demonstrate how to handle and store wood shingle shakes.

PERFORMANCE OBJECTIVE 104

CRITERION-REFERENCED MEASURE

Questions

1. All exposed nails must be covered with ____________.
2. At a roof opening use a ____________ ____________ ______________.
3. At the opening the base flashing is attached to the ____________.

Answers

1. Sealant
2. Double flashing system
3. Roof

Practical Application

Have students install wood shingle/shakes around roof openings. The shingles should be tight to the roof opening, must not leak, and exposed nails must be covered with sealant.

Method of Evaluating Practical Application

Use Checklist Performance Objective 104 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 104 EVALUATION

INSTALLING WOOD SHINGLE/SHAKES

Student's Name Date

DIRECTIONS TO STUDENT	Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.
DIRECTIONS TO EVALUATOR	Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Tucked last full row of shingles under flashing at bottom of roof opening.		
2. Measured distance from last full shingle to roof opening on next row.		
3. Cut shingle to size.		
4. Positioned and nailed shingles on roof with two nails. (NOTE: Do not pierce flashings with nails.)		
5. Placed step flashing overlapping back of shingles.		
6. Nailed top and bottom corners of step flashing.		
7. Continued procedure along both sides of opening.		
8. Continued full row of shingles over top of opening.		
9. Applied sealant to any exposed nails at bottom of opening.		

APPROVED: YES _____ NO ____

Evaluator's Signature Date

DUTY INSTALLING ROOF COMPONENTS

PERFORMANCE OBJECTIVE 105

TASK

Install gutter(s)

STANDARD OF PERFORMANCE OF TASK

Gutter must be free of leaks and must be secured to roof every 2 feet.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK:

Standard tool kit
Electric drill and bits
End caps
Galvanized nails
Gutter apron
Gutter corners
Gutter hangers
Gutters
Ladder
Liquid solder
Plans and specifications
Pop rivet gun
Pop rivets

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Use power drill.

RESOURCE

Wagner. **Modern Carpentry**, pp. 261-263.

TEACHING ACTIVITIES

1. Read and discuss **Modern Carpentry**, pp. 261-263.
2. Explain the reasons and purposes for installing gutters.
3. Have the students list the suitable sizes of guttering for specified roofs.
4. Have the students calculate the amount of slope required for given lengths of guttering.
5. Name the different parts of a gutter system.
6. Demonstrate the installation of guttering.
7. Demonstrate the use of sealant and fastening devices.

PERFORMANCE OBJECTIVE 105

CRITERION-REFERENCED MEASURE

Questions

1. The suitable size gutter for a roof area of up to 750 square feet is ___________.
2. Metal gutters usually are sloped one inch for every ___________.
3. Gutters collect rainwater from the edge of the roof and carry it to the ___________.

Answers

1. 4 inch
2. 12 to 16 feet of length
3. Downspouts

Practical Application

Have students install gutters. The gutters must be free of leaks and must be secured to roof every 2 feet.

Method of Evaluating Practical Application

Use Checklist Performance Objective 105 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 105 EVALUATION

INSTALLING GUTTERS

Student's Name **Date**

DIRECTIONS TO STUDENT: Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR: Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for gutter placement.		
2. Nailed gutter apron along roof.		
3. Measured required length of gutter.		
4. Cut gutter to length with tin snips.		
5. Positioned corners or end caps on gutter.		
6. Drilled 1/8 inch holes through gutter and corner or gutter and end cap; six holes recommended; two front, two bottom, two back.		
7. Fastened end caps or corners with pop rivets through holes.		
8. Sealed pop rivets and joints with liquid solder.		
9. Hooked gutter into gutter apron.		
10. Attached specified gutter hangers every 2 feet along gutter.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY INSTALLING ROOF COMPONENTS

PERFORMANCE OBJECTIVE 106

TASK

Install downspout (leader)

STANDARD OF PERFORMANCE OF TASK

Downspout must run from gutter to drainage system in ground; must be secured to building, and free of leaks.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Downspout
Downspout elbows
Eave tube
Electric drill and bits
Fasteners
Liquid Solder
Plans and specifications
Pop rivet gun
Pop rivets
Tin snips

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Use standard texts.
3. Use electric drill.

RESOURCE

Wagner. **Modern Carpentry**, pp. 261-263.

TEACHING ACTIVITIES

1. Read and discuss **Modern Carpentry**, pp. 261-263.
2. Discuss the parts of a downspout.
3. List the size of downspouts required of specifed roof areas.
4. Explain and discuss the installation of downspouts.
5. Have a student select the materials and parts of a downspout.
6. Demonstrate how to install downspout.

PERFORMANCE OBJECTIVE 106

CRITERION-REFERENCED MEASURE

Questions

1. Downspouts are used to direct water away from the ___________.
2. The downspout size is determined by the ___________.
3. If using metal downspouts each joint should be sealed with ___________.

Answers

1. Foundation
2. Roof area
3. Liquid solder

Practical Application

Have students install downspout. Downspouts must run from gutter to drainage system in ground, must be secured to building, and free of leaks.

Method of Evaluating Practical Application

Use Checklist Performance Objective 106 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 106 EVALUATION

INSTALLING DOWNSPOUT

Student's Name **Date**

DIRECTIONS TO STUDENT — Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR — Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Located position of eave tube on gutter.		
3. Drilled 1/8 inch holes through edges of eave tube and gutter.		
4. Cut hole in bottom of gutter with snips to inside perimeter of eave tube.		
5. Attached eave tube to bottom of gutter with pop rivets through holes.		
6. Beaded liquid solder around top of eave tube.		
7. Measured length of downspout needed from eave tube to drainage system.		
8. Cut length of downspout.		
9. Positioned downspout over eave tube. (NOTE: If soffit overhang holds gutter away from building, return downspout to wall using 45° elbows and short lengths of downspout.)		
10. Returned downspout to wall using 45° elbows and short lengths of downspout for gutters on soffit overhang.		
11. Secured downspout to wall with fasteners.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

INSTALLING EXTERIOR FINISHES

DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 107

TASK

Construct box cornice

STANDARD OF PERFORMANCE OF TASK

Box cornice must be level; and parallel with wall; dimensions and location of box cornice must be as specified on plans and specifications.

SOURCE OF STANDARD

Residential Carpentry, p. 473.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Exposed rafters
Galvanized nails
Plans and specifications
Scaffold
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Use an electric saw.
3. Measure and mark accurately.

RESOURCE

Baker. **Carpentry Fundamentals,** pp. 269-273.

TEACHING ACTIVITIES

1. Read and discuss **Carpentry Fundamentals,** pp. 269-273.
2. Discuss materials and tools to be used in constructing a box cornice.
3. Demonstrate how to cut out the parts of a box cornice.
4. Have a student demonstrate how to level box cornice.
5. Demonstrate how to construct and install box cornice.
6. Identify the different types of cornices.

PERFORMANCE OBJECTIVE 107

CRITERION-REFERENCED MEASURE

Questions

1. Box cornice must be level and ____________.
2. To get the box cornice parallel with the wall, place a level against the bottom edge of two end ____________.
3. The ledger is nailed to the ____________.

Answers

1. Parallel with wall
2. Rafters
3. Wall studs

Practical Application

Have students construct box cornice level. It must be parallel with wall, and dimensions and location are to be as specified on plans and specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 107 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 107 EVALUATION

CONSTRUCTING BOX CORNICE

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for cornice detail.		
2. Placed level against bottom edge of two end rafters.		
3. Marked where top of level touches sheathing.		
4. Struck chalk line between two points.		
5. Checked line for level.		
6. Cut ledger to length.		
7. Tacked ledgers along length of cornice.		
8. Calculated placement and length of lookouts.		
9. Cut lookouts.		
10. Determined dimensions of corner lookouts.		
11. Cut corner lookouts.		
12. Removed ledger.		
13. Nailed lookouts.		
14. Raised assembled cornice.		
15. Nailed ledger to studs.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 107 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
16. Nailed lookouts to rafters.		
17. Nailed corner lookouts.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 108

TASK

Construct rake cornice

STANDARD OF PERFORMANCE OF TASK

Rake cornice must be straight and true following the rake of the roof, with tight joint between fascia and soffit.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Galvanized nails
Plans and specifications
Scaffold
Straight stock

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Select straight stock.
3. Use circular saw.

RESOURCE

Baker. **Carpentry Fundamentals**, pp. 269-273.

TEACHING ACTIVITIES

1. Read and discuss **Carpentry Fundamentals**, pp. 269-273.
2. Compare a rake cornice with a box cornice.
3. Have the students select the locations for rake cornices to be constructed.
4. Demonstrate measuring and cutting part of a rake cornice.
5. Demonstrate how to install a rake cornice.
6. Have the students construct and install rake cornice.

PERFORMANCE OBJECTIVE 108

CRITERION-REFERENCED MEASURE

Questions

1. Rake cornice must be straight and true following the rake of the ____________.
2. A tight joint should be between the fascia and the ____________.
3. The soffit should be nailed to the underside of the ____________.

Answers

1. Roof
2. Soffit
3. Blocking

Practical Application

Have students construct rake cornice. The rake cornice must be straight and true following the rake of the roof, with tight joint between fascia and soffit.

Method of Evaluating Practical Application

Use Checklist Performance Objective 108 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 108 EVALUATION

CONSTRUCTING RAKE CORNICE

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for cornice detail.		
2. Cut blocking as required on plans.		
3. Nailed blocking along rake of gable end.		
4. Measured along rake for fascia length.		
5. Cut fascia.		
6. Nailed fascia to blocking.		
7. Measured along rake for soffit length.		
8. Cut soffit.		
9. Nailed soffit to underside of blocking.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 109

TASK

Case exterior opening

STANDARD OF PERFORMANCE OF TASK

Casing must be plumb, level, with joints tight and show specified "reveal".

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Casing
Circular saw
Galvanized nails
Plans and specifications

ENABLING OBJECTIVES

1. Use standard tools.
2. Interpret plans and specifications.
3. Measure and mark accurately.

RESOURCE

Feirer. **Carpentry and Building Construction**, pp. 340-342.

TEACHING ACTIVITIES

1. Read and discuss **Carpentry and Building Construction**, pp. 340-342.
2. Select the rough opening and compare it to specified cased opening.
3. Define and explain what the specified "reveal" refers to.
4. Have a student measure horizontal and vertical opening dimensions.
5. Demonstrate how to measure and mark side casing to show specified "reveal".
6. Demonstrate how to case an exterior opening.

PERFORMANCE OBJECTIVE 109

CRITERION-REFERENCED MEASURE

Questions

1. Casing should always be ____________.
2. The joints of the casing should be tight and show ____________.
3. The nails in the casing should be ____________.

Answers

1. Plumb and level
2. Specified reveal
3. Set

Practical Application

Have students case exterior opening. The casing must be plumb, level, with joints tight and show specified "reveal".

Method of Evaluating Practical Application

Use Checklist Performance Objective 109 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 109 EVALUATION

CASING EXTERIOR OPENING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications.		
2. Measured horizontal and vertical opening dimensions.		
3. Measured and marked side casing members to show "reveal".		
4. Cut side casing members with heads exposed.		
5. Nailed side casing.		
6. Measured and marked top casing member.		
7. Cut top casing member.		
8. Aligned top casing with side casing.		
9. Nailed top casing.		
10. Nailed remainder of casing.		
11. Set nails.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 110

TASK

Install wood jamb window unit

STANDARD OF PERFORMANCE OF TASK

Window unit must be plumb, level, and securely fastened to frame; window must operate freely.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Galvanized nails
Plans and specifictions
Shim materials
Window unit

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Measure and mark accurately.
3. Plumb using a level and a string.

RESOURCE

Wagner. **Modern Carpentry**, pp. 276-281.

TEACHING ACTIVITIES

1. Read and discuss **Modern Carpentry**, pp. 276-281.
2. Have the students measure and list the sizes of different windows.
3. Explain the importance of having the window unit plumb, level, and securely fastened to frame.
4. Have a student select materials to be used to install a wood jamb window unit.
5. Demonstrate how to install a wood jamb window unit.

PERFORMANCE OBJECTIVE 110

CRITERION-REFERENCED MEASURE

Questions

1. Window unit should be fastened to the ___________.
2. It is easy to install wood jamb window units if the rough opening is plumb, level, and ___________.
3. The installed window should operate ___________.

Answers

1. Framing
2. Correct size
3. Freely

Practical Application

Have students install wood jamb window unit. It must be plumb, level, and securely fastened to frame. The window must operate freely.

Method of Evaluating Practical Application

Use Checklist Performance Objective 110 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 110 EVALUATION

INSTALLING WOOD JAMB WINDOW UNIT

Student's Name **Date**

DIRECTIONS TO STUDENT — Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR — Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for window detail.		
2. Checked window size.		
3. Lifted window unit into opening.		
4. Leveled, plumbed, and shimmed window unit.		
5. Nailed window molding or flange to framing at top to hold unit in place.		
6. Checked window unit for plumb and level.		
7. Nailed window unit to framing.		
8. Checked opening operation of window and adjusted as necessary.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 111

TASK

Hang exterior door

STANDARD OF PERFORMANCE OF TASK

Door must be plumb with 1/16 inch clearance at top and latch side, and 1/32 inch clearance at hinge side; and door must operate freely.

SOURCE OF STANDARD

Modern Carpentry, p. 368.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Doors
Hinges
Plans and specifications

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Use standard seals.
3. Plumb using a string or a level.

RESOURCE

Wagner. **Modern Carpentry**, pp. 427-430.

TEACHING ACTIVITIES

1. Read and discuss **Modern Carpentry**, pp. 427-430.
2. Discuss the parts required for hanging an exterior door.
3. Given an opening, have a student choose which way the door should swing and explain why.
4. Have a student determine if the door is a left hand or right hand door.
5. Describe what size opening is needed for a given size door frame.
6. Demonstrate how to hang an exterior door.

PERFORMANCE OBJECTIVE 111

CRITERION-REFERENCED MEASURE

Questions

1. Door clearance at the top should be ___________.
2. On the latch side the clearance is 1/16 inch but the hinge side's clearance should be ___________.
3. If cutting an opening in a door, it should never be closer than 5 inches to the ___________.

Answers

1. 1/16 inch
2. 1/32 inch
3. Edge

Practical Application

Have students hang exterior door. The door must be plumb with 1/16 inch clearance at top and latch side, and 1/32 inch clearance at hinge side. The door must operate freely.

Method of Evaluating Practical Application

Use Checklist Performance Objective 111 to determine if the assignment was completed accurately.

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CHECKLIST FOR PERFORMANCE OBJECTIVE 111 EVALUATION

HANGING EXTERIOR DOOR

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications for door detail.		
2. Placed wedge in threshold position.		
3. Set door in jamb opening.		
4. Wedged door in place from latch side.		
5. Shimmed door bottom to establish head clearance.		
6. Checked for fit.		
7. Marked approximate hinge locations on door and jamb.		
8. Checked for clearances.		
9. Removed door.		
10. Completed lay out and marked exact hinge locations on door and jamb.		
11. Chiseled gains (insets).		
12. Set hinges in place.		
13. Removed hinge pins and secured leaves to jamb and door with two screws.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 111 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
14. Test-hung door inserting pins.		
15. Adjusted for clearance and operation.		
16. Installed remaining screws in hinges.		
17. Checked for operation.		
18. Installed threshold.		
19. Cut bottom of door if needed.		

APPROVED: YES ____ NO ____

Evaluator's Signature Date

DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 112

TASK

Install exterior door jamb

STANDARD OF PERFORMANCE OF TASK

Door jamb must be plumb, square, and securely fastened to frame.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Door jamb with dadoes
Plans and specifications
Shims
Straightedge
Straight stock

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Use circular saw.
3. Plumb and square using a string and a level.

RESOURCE

Wagner. **Modern Carpentry**, pp. 288-291.

TEACHING ACTIVITIES

1. Read and discuss **Modern Carpentry**, pp. 288-291.
2. Review and explain how to read plans and specifications.
3. Sketch a rough drawing of an exterior door jamb.
4. Question students about the joints required in constructing exterior door jamb.
5. Have the students cut and construct exterior door jamb.
6. Demonstrate how to install an exterior door jamb.

PERFORMANCE OBJECTIVE 112

CRITERION-REFERENCED MEASURE

Questions

1. The top part of the jamb is called the ___________.
2. Shims should be installed near the ___________.
3. The jamb will be fastened to the door ___________.

Answers

1. Head jamb
2. Hinge and knob locations
3. Frame

Practical Application

Have students install exterior door jamb. The jamb must be plump, square and securely fastened to the frame.

Method of Evaluating Practical Application

Use Checklist Performance Objective 112 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 112 EVALUATION

INSTALLING EXTERIOR DOOR JAMB

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications for door jamb detail.		
2. Checked rough opening dimensions.		
3. Measured, marked, and cut two side jambs to height with dadoes for head level.		
4. Measured, marked, and cut head jamb to width.		
5. Nailed side jambs into head jamb.		
6. Cut temporary spacer piece width of inside opening as measured at head jamb.		
7. Set jamb unit in position in rough opening with spacer at bottom.		
8. Plumbed edge and faced with shims on both sides at head and sill to hold jamb in place.		
9. Inserted shims near hinge and knob locations.		
10. Maintained position and nailed jamb to frame.		
11. Checked for square.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

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DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 113

TASK

install metal corner for aluminum or vinyl siding

STANDARD OF PERFORMANCE OF TASK

Corner must be plumb, straight, securely fastened to framing.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Galvanized nails
Manufacturer's instructions
Metal corner strips
Scaffold
Sheathed exterior wall
Tin snips

ENABLING OBJECTIVES

1. Interpret manufacturer's instructions.
2. Assemble scaffold.
3. Use tin snips.

RESOURCE

Wagner. **Modern Carpentry**, pp. 319-320.

TEACHING ACTIVITIES

1. Read and discuss **Modern Carpentry**, pp. 319-320.
2. Explain and discuss the manufacturer's instructions.
3. Show the different types of corners, inside and outside.
4. Have a student select which corner piece will be used and where.
5. Demonstrate how to install metal corner for aluminum or vinyl siding.

PERFORMANCE OBJECTIVE 113

CRITERION-REFERENCED MEASURE

Questions

1. Metal corner posts usually come in ___________ lengths.
2. Metal corner posts will be factory finished with ___________.
3. The metal corner should be plumb, straight, and ___________.

Answers

1. 10 feet
2. Baked-on enamel
3. Securely fastened to framing

Practical Application

Have students install metal corner for aluminum or vinyl siding. It must be plumb, straight, and securely fastened to framing.

Method of Evaluating Practical Application

Use Checklist Performance Objective 113 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 113 EVALUATION

INSTALLING METAL CORNER FOR ALUMINUM OR VINYL SIDING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Read manufacturer's instructions.		
2. Installed starter strip.		
3. Measured for length of corner piece.		
4. Cut corner piece.		
5. Set into position at corner.		
6. Nailed top.		
7. Checked for plumb, adjusted as necessary.		
8. Nailed corner in position as per manufacturer's instructions.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 114

TASK

Install corner board for wood siding

STANDARD OF PERFORMANCE OF TASK

Corner board must be plumb, straight, and securely fastened to frame.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Cove molding
Galvanized nails
Straight stock
Two sided exterior walls
Plans and specifications

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Measure, mark, and cut accurately.
3. Use standard tools.

RESOURCE

Wagner. **Modern Carpentry**, pp. 316-319.

TEACHING ACTIVITIES

1. Read and discuss **Modern Carpentry**, pp. 316-319.
2. List different types of wood siding.
3. Discuss the different types and methods of installing corner board for wood siding.
4. Have a student measure corner and list the length of corner board needed.
5. Demonstrate how to install corner board for wood siding.

PERFORMANCE OBJECTIVE 114

CRITERION-REFERENCED MEASURE

Questions

1. Corner board will be fastened to the ____________.
2. Fasten corner boards with ____________.
3. Corner boards should always be ____________.

Answers

1. Frame
2. Galvanized nails
3. Straight and plumb

Practical Application

Have students install corner board for wood siding. It must be plumb, straight, and securely fastened to frame.

Method of Evaluating Practical Application

Use Checklist Performance Objective 114 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 114 EVALUATION

INSTALLING CORNER BOARD FOR WOOD SIDING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Measured for length of corner board material.		
3. Applied corner boards to one of the following: One-piece molding: a. Cut prefab board if required. b. Set board in position. c. Nailed top. d. Checked for plumb and adjusted. e. Nailed board to frame. Two-piece molding: a. Cut two boards; one board at least 1 inch wider than second board. b. Butted boards in corner position with wider board overlapping. c. Nailed board tops. d. Checked for plumb and adjusted. e. Nailed boards to framing.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 114 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
Two-piece molding with cove: a. Cut two boards of equal width. b. Set boards in position, one on each wall edge. c. Nailed tops. d. Checked for plumb and adjusted. e. Nailed boards to framing. f. Cut cove molding to length. g. Fitted in gap between corner boards. h. Nailed in place.		

APPROVED: YES _____ NO ____

Evaluator's Signature Date

DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 115

TASK

Install wood fascia

STANDARD OF PERFORMANCE OF TASK

Fascia must be straight, level, and securely fastened with tight joints.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Galvanized nails
Plans and specifications
Rafter ends
Scaffold
Straight stock

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Assemble scaffold.
3. Use circular saw.
4. Measure and mark accurately.

RESOURCE

Wagner. **Modern Carpentry**, pp. 299-302.

TEACHING ACTIVITIES

1. Read and discuss **Modern Carpentry**, pp. 299-302.
2. Review the parts of cornice.
3. Explain the reasons for installing an exterior trim.
4. Demonstrate the different types of wood fascia.
5. Have a student prepare the rafter ends for wood fascia installation.
6. Demonstrate how to install wood fascia.

PERFORMANCE OBJECTIVE 115

CRITERION-REFERENCED MEASURE

Questions

1. The wood fascia is attached to the ___________.
2. Corners of wood fascia should be ___________.
3. To receive the soffit material sometimes the back of the fascia is ___________.

Answers

1. Rafter ends
2. Mitered
3. Grooved

Practical Application

Have students install wood fascia. It must be straight, level, and securely fastened with tight joints.

Method of Evaluating Practical Application

Use Checklist Performance Objective 115 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 115 EVALUATION

INSTALLING WOOD FASCIA

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for fascia detail.		
2. Measured for length of fascia.		
3. Checked rafter ends for alignment.		
4. Cut rafter ends if necessary.		
5. Cut fascia to length.		
6. Cut joints of fascia boards at 45° on plumb cut.		
7. Nailed fascia to rafter ends.		
8. Checked position and shimmed if required.		
9. Set nails.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 116

TASK

Install wood soffit

STANDARD OF PERFORMANCE OF TASK

Soffit must be straight, level, and securely fastened to framing.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Fascia
Galvanized nails
Plans and specifications
Scaffold
Soffit stock

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Measure area and mark accurately.
3. Use circular saw safely.

RESOURCE

Wagner. **Modern Carpentry**, pp. 299-302.

TEACHING ACTIVITIES

1. Read and discuss **Modern Carpentry**, pp. 299-302.
2. Demonstrate how to prepare area to receive wood soffit.
3. Have a student measure and explain what size the wood soffit needs to be cut.
4. Show students how to prepare wood soffit to be vented and explain importance of proper venting.
5. Demonstrate how to install wood soffit.

PERFORMANCE OBJECTIVE 116

CRITERION-REFERENCED MEASURE

Questions

1. Level soffit should be leveled back from the __________.
2. Wooden soffit should be fastened to __________.
3. A sloping wood soffit can be fastened to the __________.

Answers

1. Bottom edge of the rafter
2. Lookouts
3. Bottom of the rafters

Practical Application

Have students install wood soffit. It must be straight, level, and securely fastened to framing.

Method of Evaluating Practical Application

Use Checklist Performance Objective 116 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 116 EVALUATION

PERFORMANCE TEST FOR INSTALLING WOOD SOFFIT

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications for soffit detail.		
2. Measured for length and width of soffit.		
3. Cut soffit piece to desired length and width.		
4. Butted joints of two soffit lengths at.		
5. Fitted soffit between fascia and wall in fascia groove.		
6. Nailed soffit to framing.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

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DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 117

TASK

Install aluminum fascia

STANDARD OF PERFORMANCE OF TASK

Aluminum fascia must be straight, level, free of dents and crimps; securely fastened to framing.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Aluminum fascia
Aluminum nails
Manufacturer's instructions
Subfascia

ENABLING OBJECTIVES

1. Follow manufacturer's instructions.
2. Use tools safely.

RESOURCE

Durbahn. **Fundamentals of Carpentry Practical Construction**, pp. 371-374.

TEACHING ACTIVITIES

1. Read and discuss **Fundamentals of Carpentry Practical Construction**, pp. 371-374.
2. Define the difference between fascia and soffit.
3. Compare the terminology for aluminum fascia versus wood fascia.
4. Describe the application of subfascia.
5. Have a student install subfascia and explain purpose.
6. Demonstrate how to install aluminum fascia.

PERFORMANCE OBJECTIVE 117

CRITERION-REFERENCED MEASURE

Questions

1. Aluminum fascia should be securely fastened to ____________.
2. The maintenance cost for aluminum fascia is almost ____________.
3. Aluminum fascia should be nailed according to ____________.

Answers

1. Subfascia
2. Eliminated
3. Manufacturer's instructions

Practical Application

Have students install aluminum fascia. The aluminum fascia must be straight, level, free of dents and crimps; securely fastened to framing.

Method of Evaluating Practical Application

Use Checklist Performance Objective 117 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 117 EVALUATION

INSTALLING ALUMINUM FASCIA

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Read manufacturer's instructions.		
2. Checked subfascia framing for alignment.		
3. Measured fascia for length.		
4. Cut fascia to desired length.		
5. Checked level and adjusted as necessary.		
6. Nailed as per manufacturer's instructions.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 118

TASK

Install aluminum soffit

STANDARD OF PERFORMANCE OF TASK

Aluminum soffit must be straight; free of dents and crimps; and securely fastened to framing with all joints tight.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Aluminum fascia with returned edge for soffit
Aluminum nails
Aluminum soffit
J-channel
Manufacturer's instructions
Plans and specifications

ENABLING OBJECTIVES

1. Use standard test kit.
2. Interpret manufacturer's instructions.

RESOURCE

Wagner. **Modern Carpentry**, pp. 302-305.

TEACHING ACTIVITIES

1. Read and discuss **Modern Carpentry**, pp. 302-305.
2. Discuss materials and tools to be used to install aluminum soffit.
3. Explain the advantages of using aluminum soffit.
4. Measure area and explain how much aluminum soffit will be needed.
5. Demonstrate how to install aluminum soffit.
6. Have a student demonstrate how to install aluminum soffit.

PERFORMANCE OBJECTIVE 118

CRITERION-REFERENCED MEASURE

Questions

1. The outer end of the aluminum soffit will be nailed to the ___________.
2. The length of the aluminum soffit will be the same as the ___________.
3. The end of the aluminum soffit that fits to the wall, fits in a ___________.

Answers

1. Bottom of the fascia board
2. Width of the overhang
3. J-channel

Practical Application

Have students install aluminum soffit. It must be straight, free of dents and crimps, and securely fastened to framing with all joints tight.

Method of Evaluating Practical Application

Use Checklist Performance Objective 118 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 118 EVALUATION

INSTALLING ALUMINUM SOFFIT

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Read manufacturer's instructions.		
3. Checked subframing for alignment.		
4. Measured length of overhang.		
5. Cut J-channel to length.		
6. Nailed J-channel to overhang at wall.		
7. Measured width of overhang.		
8. Cut lengths of soffit equal to width of overhang.		
9. Placed first piece soffit in J-channel, at end of overhang.		
10. Nailed front cover of soffit section at tongue edge.		
11. Continued adding subsequent soffit sections pushing tongue edge into groove.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 119

TASK

Install prefabricated column

STANDARD OF PERFORMANCE OF TASK

Column must be plumb and secure.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Plans and specifications
Prefabricated column with trim
Shim material

ENABLING OBJECTIVES

1. Use circular saw safely.
2. Interpret plans and specifications.
3. Measure and mark accurately.

RESOURCE

Koel. **Carpentry**, pp. 275-276.

TEACHING ACTIVITIES

1. Have students read **Carpentry**, pp. 275-276.
2. Show and discuss different types of prefabricated columns.
3. Explain the fastening in place of prefabricated columns.
4. Discuss the various types of column bases.
5. Demonstrate how to install prefabricated columns.

PERFORMANCE OBJECTIVE 119

CRITERION-REFERENCED MEASURE

Questions

1. Prefabricated post and columns help support the ___________.
2. Wood columns should be equal to the width of ___________.
3. Prefabricated columns must be plumb and ___________.

Answers

1. Overhead framing
2. Girder
3. Secure

Practical Application

Have students install prefabricated column plumb and secure.

Method of Evaluating Practical Application

Use Checklist Performance Objective 119 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 119 EVALUATION

INSTALLING PREFABRICATED COLUMN

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for column detail		
2. Checked height of column opening.		
3. Checked height of column.		
4. Set column in position.		
5. Shimmed column.		
6. Nailed column to subframing.		
7. Checked for plum.		
8. Nailed column bottom.		
9. Installed column trim.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 120

TASK

Install garage door

STANDARD OF PERFORMANCE OF TASK

Garage door must be plumb, level, and must open and close freely.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Garage door
Manufacturer's instructions
Straight stock

ENABLING OBJECTIVES

1. Read and follow manufacturer's specifications.
2. Select straight stock.
3. Measure, mark, and cut accurately.

RESOURCE

Wagner. **Modern Carpentry**, pp. 294-297.

TEACHING ACTIVITIES

1. Read and discuss **Modern Carpentry**, pp. 294-297.
2. Review factory instructions and specifications.
3. Describe standard sizes of garage doors.
4. Explain the importance of proper clearances.
5. Demonstrate how to install garage door.
6. Demonstrate how to test and adjust the garage door if necessary.
7. Have the students demonstrate how to install garage door.

PERFORMANCE OBJECTIVE 120

CRITERION-REFERENCED MEASURE

Questions

1. Frames for garage doors include side jambs and a ___________.
2. Various counter balancing devices are used to offset the ___________.
3. Most doors require a lot of headroom because ___________.

Answers

1. Head jamb
2. Weight of the door
3. This is where the door goes when opened

Practical Application

Have students install garage door. The door must be plumb, level, and must open and close freely.

Method of Evaluating Practical Application

Use Checklist Performance Objective 120 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 120 EVALUATION

INSTALLING GARAGE DOOR

Student's Name Date

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Read manufacturer's instruction.		
2. Selected and cut stock for track bracket supports.		
3. Nailed supports to sides of door opening.		
4. Installed vertical track.		
5. Screwed brackets in place.		
6. Bolted curved track to lower track at hanger.		
7. Installed permanent supports for horizontal track as per manufacturer's instructions.		
8. Cut stop molding.		
9. Fitted and tacked molding to frame.		
10. Set bottom door panel in opening.		
11. Checked fit.		
12. Marked floor contours on bottom panel.		
13. Removed panel and cut to fit contours.		
14. Installed bottom fixture to bottom panel as per manufacturer's instructions.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 120 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
15. Installed lift handle as per manufacturer's instructions.		
16. Set bottom panel in place.		
17. Set second panel in place.		
18. Connected panels with hinges.		
19. Continued procedure for remaining panels.		
20. Installed lock as per manufacturer's instructions.		
21. Fit rollers into edge hinges.		
22. Attached brackets to straight track if required.		
23. Added tension braces and door stiffeners as per manufacturer's instructions.		
24. Installed counterbalancing unit.		
25. Tested door and adjusted if required.		
26. Weatherstripped bottom edge as required.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 121

TASK

Install metal or vinyl siding

STANDARD OF PERFORMANCE OF TASK

Siding must be level, evenly spaced, and must be securely attached to framing.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Galvanized nails
Manufacturer's instructions
Plans and specifications
Scaffold
Siding with trim

ENABLING OBJECTIVES

1. Interpret manufacturer's instructions.
2. Erect scaffold.
3. Measure, mark, and cut accurately.

RESOURCE

Koel. **Carpentry**, pp. 482-484.

TEACHING ACTIVITIES

1. Have the students read **Carpentry, pp.** 482-484.
2. Distinguish the difference between metal and vinyl siding.
3. List the advantages of using metal or vinyl siding.
4. Demonstrate how to install trim for installing metal or vinyl siding.
5. Discuss and explain the starter strip.
6. Have a student identify correct procedures of handling metal or vinyl siding.
7. Demonstrate how to install metal or vinyl siding.

PERFORMANCE OBJECTIVE 121

CRITERION-REFERENCED MEASURE

Questions

1. Metal siding is resistant to ____________.
2. Aluminum siding is very popular for ____________ units.
3. Joints between panels should be ____________.

Answers

1. Corrosion
2. Residential
3. Staggered

Practical Application

Have students install metal or vinyl siding. The siding must be level, evenly spaced, and must be securely attached to framing.

Method of Evaluating Practical Application

Use Checklist Performance Objective 121 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 121 EVALUATION

INSTALLING METAL OR VINYL SIDING

Student's Name **Date**

DIRECTIONS TO STUDENT	Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.
DIRECTIONS TO EVALUATOR	Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications for siding location and treatment.		
2. Read manufacturer's instructions.		
3. Marked location of bottom edge of starter strip at sill.		
4. Fastened starter strip.		
5. Installed corner posts.		
6. Installed trim components around openings.		
7. Slipped bottom edge of first course into starter strip slot.		
8. Pushed until joint is tight.		
9. Nailed through slots.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 122

TASK

Install prefabricated storm unit

STANDARD OF PERFORMANCE OF TASK

Door or window unit must be plumb, level, and securely fastened to frame; unit must open and close freely.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Manufacturer's instructions
Plans and specifications
Prefabricated door or window unit
Wood Screws

ENABLING OBJECTIVES

1. Interpret manufacturer's instructions.
2. Use standard test list.
3. Plumb using a level or string.

RESOURCE

Drake. **Weatherizng Your Home**, pp. 176, 187-191.

TEACHING ACTIVITIES

1. Read and discuss **Weatherizing Your Home**, pp. 176, 187-191.
2. Explain the purpose of prefabricated storm unit.
3. Identify the various types of prefabricated storm units.
4. Demonstrate how to install storm window.
5. Demonstrate how to install storm door.
6. Have students demonstrate how to install prefabricated storm units.

PERFORMANCE OBJECTIVE 122

CRITERION-REFERENCED MEASURE

Questions

1. Storm windows aid in the reduction of ___________.
2. Prefabricated storm units consist of storm windows and ___________.
3. Storm windows can be made with a roll of ___________.

Answers

1. Heat
2. Storm doors
3. Sheet vinyl

Practical Application

Have students install prefabricated storm unit. The unit must be plumb, level, and securely fastened to frame; unit must open and close properly.

Method of Evaluating Practical Application

Use Checklist Performance Objective 122 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 122 EVALUATION

INSTALLING PREFABRICATED STORM UNIT

Student's Name **Date**

DIRECTIONS TO STUDENT — Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR — Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Read manufacturer's instructions.		
3. Measured opening size.		
4. Measured and compared unit size.		
5. Lifted unit into position.		
6. Plumbed and leveled unit.		
7. Fastened unit at top and bottom.		
8. Checked for operation.		
9. Completed fastening of unit.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 123

TASK

Install drip cap

STANDARD OF PERFORMANCE OF TASK

Drip cap must be level and securely fastened.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Drip cap
Galvanized nails
Plans and specifications

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Use standard test kit.
3. Use circular saw safely.

RESOURCE

Koel. **Carpentry**, pp. 468, 470, 473.

TEACHING ACTIVITIES

1. Read and discuss **Carpentry**, pp. 468, 470, 473.
2. Have a student identify the locations for installing drip cap.
3. Discuss the installation of drip cap in relation to siding installation.
4. Tell the students that flashing is needed over drip cap at doors and windows.
5. Demonstrate how to install drip cap.

PERFORMANCE OBJECTIVE 123

CRITERION-REFERENCED MEASURE

Questions

1. A piece of molding placed over exterior wood frames to direct water away from a door or window is called ____________.
2. A chalk line can be used to ____________.
3. Drip caps are nailed on a horizontal line to ____________.

Answers

1. Drip cap
2. Level drip cap
3. Framing

Practical Application

Have students install drip cap. The cap must be level and securely fastened.

Method of Evaluating Practical Application

Use Checklist Performance Objective 123 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 123 EVALUATION

INSTALLING DRIP CAP

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Measured for length of drip cap required.		
3. Marked and cut drip cap.		
4. Struck chalk line level for horizontal alignment of drip cap.		
5. Held drip cap in position.		
6. Nailed to framing on horizontal line.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 124

TASK

Install bevel siding

STANDARD OF PERFORMANCE OF TASK

Siding must be level, evenly spaced, securely attached to framing; nails must be at least 8 penny and all exposed edges must be primed.

SOURCE OF STANDARD

Residential Carpentry, p. 444.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Exterior sheathed wall
Galvanized nails
Plans and specifications
Primed wood siding material
Primed wood trim material
Straight stock

ENABLING OBJECTIVES

1. Select needed tool and equipment for installing bevel siding.
2. Choose proper safety equipment.
3. Measure, mark, and cut accurately.
4. Use circular saw safely.

RESOURCE

Koel. **Carpentry**, pp. 469-470.

TEACHING ACTIVITIES

1. Read and discuss **Carpentry**, pp. 469-470.
2. Explain term story pole.
3. Demonstrate how to obtain slant in first course.
4. Explain the cut out procedures around openings.
5. Explain how and where to fasten siding.
6. Demonstrate how to install bevel siding.

PERFORMANCE OBJECTIVE 124

CRITERION-REFERENCED MEASURE

Questions

1. All exposed edges must be ___________.
2. Bevel siding should overlap at least _____________.
3. The starter strip should be the same size as ___________.

Answers

1. Primed
2. 1 inch
3. The thin edge of bevel siding

Practical Application

Have the students install bevel siding. The siding must be level, evenly spaced, securely attached to framing. Nails must be at least 8 penny and all exposed edges must be primed.

Method of Evaluating Practical Application

Use Checklist Performance Objective 124 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 124 EVALUATION

INSTALLING BEVEL SIDING

Student's Name ______________________ Date ______________

DIRECTIONS TO STUDENT — Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR — Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Fastened primed wood starter strip to sill plate.		
3. Cut corner boards.		
4. Cut 2 inch wedges.		
5. Installed corner boards.		
6. Installed wedges at corner boards and over studs at ends of siding lengths.		
7. Laid out story pole to establish equal exposed space for siding.		
8. Nailed first course of siding with bottom edge 1/4 inch below starter strip.		
9. Used spacer block to locate second course.		
10. Overlapped second and all succeeding courses.		
11. Nailed second and succeeding courses through siding and sheathing into framing member until wall is complete.		

APPROVED: YES _____ NO _____

Evaluator's Signature ______________________ Date ______________

DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 125

TASK

Install wood shingle siding

STANDARD OF PERFORMANCE OF TASK

Siding must be level with two nails per shingle 3/4 inch in from edge and 1 to 2 inches above butt of succeeding course. If shingles are within 12 inches of finished grade, first course must be treated with wood preservative.

SOURCE OF STANDARD

Residential Carpentry, p. 454.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Galvanized nails
Manufacturer's instructions
Plans and specifications
Scaffold
Sheathed exterior wall
Straight stock
Wood shingles

ENABLING OBJECTIVES

1. Record from plans coursing details.
2. Measure, mark, and cut accurately.
3. Erect scaffold correctly.

RESOURCE

Koel. **Carpentry**, pp. 478-482.

TEACHING ACTIVITIES

1. Have the students read and discuss **Carpentry**, pp. 478-482.
2. Discuss the methods of application of wood shingle siding.
3. Explain single coursing and double coursing of wood shingle siding.
4. Demonstrate how to use a chalk line to level shingles.
5. Demonstrate the correct nailing procedure for installing wood shingle siding.
6. Demonstrate how to install wood shingle siding..

PERFORMANCE OBJECTIVE 125

CRITERION-REFERENCED MEASURE

Questions

1. The first course of wood shingle siding must be ___________.
2. If wood shingle is less than eight inches you use ___________.
3. Nails used to fasten shingle siding must be ___________.

Answers

1. Treated
2. Two nails
3. Rust proof

Practical Application

Have students install wood shingle siding. The siding must be level, nailed properly, and first course must be treated with wood preservative.

Method of Evaluating Practical Application

Use Checklist Performance Objective 125 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 125 EVALUATION

INSTALLING WOOD SHINGLE SIDING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for coursing and details.		
2. Read manufacturer's installation instructions.		
3. Struck chalk line on foundation wall for bottom course.		
4. Installed corner boards if necessary.		
5. Laid out story pole for coursing.		
6. Nailed first course with butts level.		
7. Marked location of butt line for succeeding courses.		
8. Nailed second course directly over first course covering joints.		
9. Continued procedure for succeeding courses.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY INSTALLING EXTERIOR FINISHING

PERFORMANCE OBJECTIVE 126

TASK

Install outside corner of wood shingle siding

STANDARD OF PERFORMANCE OF TASK

Corners must be tight, laps even, and laps alternating on each course.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Galvanized nails
Plans and specifications
Scaffold
Shingled exterior wall
Wood shingles

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Erect scaffold correctly.
3. Use circular saw safely.

RESOURCE

Koel. **Carpentry**, pp. 480-481.

TEACHING ACTIVITIES

1. Have the students read **Carpentry, pp.** 480-481.
2. Demonstrate the differences between woven and mitered corners.
3. Explain the purpose and installation of corner nailing strips.
4. Identify the correct procedure for installing wood shingle siding.
5. Demonstrate how to approach the corners.
6. Describe the difference between inside and outside corners.
7 Have students practice cutting mitered shingles.
8. Demonstrate how to install outside corner of wood shingle siding.

PERFORMANCE OBJECTIVE 126

CRITERION-REFERENCED MEASURE

Questions

1. Shingles cut on 45 degree angles are called ____________.
2. Woven shingles should be alternated on each ____________.
3. Wood shingle corners can be mitered or ____________.

Answers

1. Mitered
2. Course
3. Woven

Practical Application

Have students install outside corner of wood shingle siding. The corners must be tight, laps even, and laps alternating on each course.

Method of Evaluating Practical Application

Use Checklist Performance Objective 126 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 126 EVALUATION

INSTALLING OUTSIDE CORNER OF WOOD SHINGLE SIDING

Student's Name **Date**

DIRECTIONS TO STUDENT	Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.
DIRECTIONS TO EVALUATOR	Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Installed first shingle course to corner with minimum 1/8 inch projection.		
3. Held return corner shingle in place.		
4. Scribed line on back of shingle marking edge of first shingle.		
5. Cut shingle along line.		
6. Nailed shingle in place, lapping edge neatly over first shingle.		
7. Continued procedure alternating lap on each succeeding course.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 127

TASK

Install panel siding

STANDARD OF PERFORMANCE OF TASK

Siding must be level, plumb, with bottom edge 1/4 inch below sill, horizontal joints must be sealed.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Galvanized nails
Manufacturer's instructions
Panel siding
Plans and specifications
Sealant
Sheathed exterior wall

ENABLING OBJECTIVES

1. Plumb and level using a bubble level.
2. Use a circular saw safely.

RESOURCE

Koel. **Carpentry**, pp. 474-478.

TEACHING ACTIVITIES

1. Read and discuss **Carpentry**, pp. 474-478.
2. Identify the various types of materials used to make panel siding.
3. Show the standard size of panel siding.
4. Identify various types of siding.
5. Describe proper nails to be used.
6. Demonstrate the proper nailing procedures.
7. Have the students demonstrate how to install panel siding.

PERFORMANCE OBJECTIVE 127

CRITERION-REFERENCED MEASURE

Questions

1. Panel siding can be installed more quickly than ________________.
2. Panel siding may be applied directly to __________.
3. Panel siding is usually made from plywood or __________.

Answers

1. Board siding
2. Studs
3. Hardboard

Practical Application

Have the students install panel siding.

Method of Evaluating Practical Application

Use Checklist Performance Objective 127 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 127 EVALUATION

INSTALLING PANEL SIDING

Student's Name **Date**

DIRECTIONS TO STUDENT	Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.
DIRECTIONS TO EVALUATOR	Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for siding specifications.		
2. Read manufacturer's installation instructions.		
3. Established size of first panel to maintain symmetry of pattern.		
4. Set first panel into position with edges located over center of framing members.		
5. Tacked into place with bottom edge at least 1/4 inch below wood sill.		
6. Checked for plumb.		
7. Leveled first panel.		
8. Nailed panel in place.		
9. Continued installing panels around building perimeter.		
10. Sealed horizontal joints.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 128

TASK

Construct and install wood louvers

STANDARD OF PERFORMANCE OF TASK

Louver unit must have square corners, with fitted louvers, and must be securely fastened in wall opening.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Galvanized nails
Plans and specifications
Screening
Staple gun
Staples
Straight stock

ENABLING OBJECTIVES

1. Square and plumb using a level.
2. Use a circular saw safely.
3. Measure, mark, and cut accurately.

RESOURCE

Koel. **Carpentry**, pp. 172, 406.

TEACHING ACTIVITIES

1. Have the students read **Carpentry,** pp. 172, 406.
2. Discuss the shapes and sizes of wood louvers.
3. Allow a student to measure opening and list needed size of wood louver.
4. Explain why the members of the louver is slanted.
5. List purposes of wood louvers.
6. Name the locations for wood louvers.
7. Demonstrate how to construct a wood louver.
8. Demonstrate how to install a wood louver.

PERFORMANCE OBJECTIVE 128

CRITERION-REFERENCED MEASURE

Questions

1. Boards are slanted to prevent rain water from ___________.
2. The oldest ventilation system is ___________.
3. Gable end louvers are necessary for ___________.

Answers

1. Entering
2. Louvers
3. Ventilation

Practical Application

Have students construct and install wood louvers. The louvers must have square corners, with fitted louvers, and must be securely fastened in wall opening.

Method of Evaluating Practical Application

Use Checklist Performance Objective 128 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 128 EVALUATION

CONSTRUCTING AND INSTALLING WOOD LOUVERS

Student's Name Date

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for location and dimensions of louvers.		
2. Measured rough opening for louver frame.		
3. Cut louver frame members.		
4. Nailed together.		
5. Measured inside frame for length of louvers.		
6. Laid out louver locations on frame sides.		
7. Set louvers at 45° with top of each louver about 1/2 inch above bottom of next louver.		
8. Cut louvers.		
9. Set louvers in place.		
10. Nailed louver end to frame.		
11. Cut screen to outside dimension of frame.		
12. Stapled screen to back side of louver.		
13. Nailed louver unit in place.		
14. Plumbed and squared.		

APPROVED: YES ____ NO ____

Evaluator's Signature Date

DUTY INSTALLING EXTERIOR FINISHES

PERFORMANCE OBJECTIVE 129

TASK

Install fixed exterior shutters

STANDARD OF PERFORMANCE OF TASK

Shutters must be level, plumb, and securely fastened to wall.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Plans and specifications
Screws
Shutters

ENABLING OBJECTIVES

1. Select safety equipment.
2. Interpret plans and specifications.

RESOURCE

Feirer. **Carpentry and Building Construction**, pp. 702-706.

TEACHING ACTIVITIES

1. Have students read **Carpentry and Building Construction**, pp. 702-706.
2. Explain the purpose of shutters on today's market.
3. Identify various types of materials used to make shutters.
4. Have student explain purpose of plumbing and leveling shutters.
5. Demonstrate how to install fixed exterior shutters.

PERFORMANCE OBJECTIVE 129

CRITERION-REFERENCED MEASURE

Questions

1. Shutters can be made from wood, nylon, vinyl, or ___________.
2. Shutters are available in a variety of ___________ _____ ___________.
3. Shutters are used today for ___________ _____.

Answers

1. Aluminum
2. Sizes and styles
3. Architectural effect

Practical Application

Have students install fixed exterior shutters. The shutters must be level, plumb, and securely fastened to wall.

Method of Evaluating Practical Application

Use Checklist Performance Objective 129 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 129 EVALUATION

INSTALLING FIXED EXTERIOR SHUTTERS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications for window treatment.		
2. Checked window height.		
3. Checked shutter height.		
4. Predrilled holes at four corners of shutters.		
5. Set shutter in place against wall.		
6. Checked top and bottom alignment.		
7. Screwed shutter securely in place.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

INSTALLING INTERIOR FINISHES

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 130

TASK

Install batt insulation

STANDARD OF PERFORMANCE OF TASK

Batt insulation must be recessed 3/4 inch; staples must be driven flush; faces of studs and joists must be free of insulation. R factor of insulation used must comply with plans and specifications.

SOURCE OF STANDARD

Residential Carpentry, p. 296.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Batt insulation with vapor barrier
Plans and specifications
Staple gun
Staples

ENABLING OBJECTIVES

1. Translate R value to thickness of insulation.
2. Read plans and specifcations for R value and location.

RESOURCE

Drake. **Weatherizing Your Home**, pp. 129-138.

TEACHING ACTIVITIES

1. Read and discuss **Weatherizing Your Home**, pp. 129-138.
2. Explain the definition of vapor barrier.
3. Discuss the importance of not blocking specified ventilation.
4. Demonstrate the tools and safety equipment needed for installing batt insulation.
5. Demonstrate how to install batt insulation.

PERFORMANCE OBJECTIVE 130

CRITERION-REFERENCED MEASURE

Questions

1. The vapor barrier always faces the ____________ ____________.
2. The insulation should be placed under the ____________ ____________.
3. Batt insulation should be recessed ____________.

Answers

1. Heated area
2. Electrical wires
3. 3/4 inch

Practical Application

Have students install batt insulation. The insulation must be properly recessed, staples flush; faces of studs and joist must be free of insulation; R factor must meet requirements.

Method of Evaluating Practical Application

Use Checklist Performance Objective 130 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 130 EVALUATION

INSTALLING BATT INSULATION

Student's Name **Date**

DIRECTIONS TO STUDENT — Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR — Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked R factor of insulation on plans and specifications.		
2. Measured height of wall between plates.		
3. Cut insulation longer than measured height to seal ends at plates.		
4. Recessed insulation 3/4 inch between studs.		
5. Stapled edge of insulation to inside of studs.		
6. Recessed insulation 3/4 inch on bottom and top plates.		
7. Stapled insulation to top and bottom plates.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 131

TASK

Install vapor barrier

STANDARD OF PERFORMANCE OF TASK

Vapor barrier must be tight and free of holes and installed.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Plans and specifications
Staple gun
Staples
Vapor barrier material

ENABLING OBJECTIVES

1. Calculate square footage.
2. Interpret plans and specifications.
3. Use standard test kit.

RESOURCE

Drake. **Weatherizing Your Home,** pp. 144-146.

TEACHING ACTIVITIES

Have students read and discuss **Weatherizing Your Home,** pp. 144-146.
2. Define a vapor barrier.
3. Demonstrate the materials to be used for vapor barrier.
4. List the tools necessary for the installation of the vapor barrier.
5. Demonstrate how to measure area for vapor barrier and calculate the materials required.
6. Demonstrate the installation of vapor barrier.

PERFORMANCE OBJECTIVE 131

CRITERION-REFERENCED MEASURE

Questions

1. Vapor barriers assist in keeping your house ____________.
2. In corners the vapor barrier is ____________.
3. If vapor barrier is overlapped six inches, it is not necessary to use ____________.

Answers

1. Warm
2. Overlapped
3. Tape

Practical Application

Have students install a vapor barrier according to plans and specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 131 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 131 EVALUATION

INSTALLING VAPOR BARRIERS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for location and type of material to be used.		
2. Measured length of surface to receive vapor barrier.		
3. Measured width of surface to receive vapor barrier.		
4. Cut vapor barrier material to size.		
5. Covered area with material.		
6. Stapled material to studs, joists, or rafters.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 132

TASK

Install wall paneling

STANDARD OF PERFORMANCE OF TASK

Wall panels must fit corners; must be plumb; must butt with no gaps; and must be located as specified on plans and specifications.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Furring strips
Nails
Panel adhesive
Plans and specifications
Shim shingles
Wall paneling

ENABLING OBJECTIVES

1. Use a circular saw safely.
2. Measure areas and calculate material required.
3. Measure, mark, and cut accurately.

RESOURCE

Durbahn. **Fundamentals of Carpentry**, pp. 413-414.

TEACHING ACTIVITIES

1. Have students read and discuss **Fundamentals of Carpentry**, pp. 413-414.
2. Discuss the materials and tools to be used in the installation of paneling.
3. Demonstrate how to measure and calculate the number of sheets of paneling required.
4. Have a student demonstrate how to measure and calculate the number of sheets of paneling required.
5. Illustrate the installation of paneling in relation to studs in wall to be paneled.
6. Demonstrate the installation of wall paneling.

PERFORMANCE OBJECTIVE 132

CRITERION-REFERENCED MEASURE

Questions

1. Standard sheet of paneling measures ____________.
2. Edges of paneling must join on ____________.
3. To figure sheets of paneling required add the length of all wall in feet and divide by ____________.

Answers

1. 4' x 8'
2. Studs
3. Four

Practical Application

Have students install wall paneling with no gaps according to specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 132 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 132 EVALUATION

INSTALLING WALL PANELING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Laid out and marked pattern.		
3. Measured and cut furring strips if necessary.		
4. Nailed furring strips in place if necessary.		
5. Shimmed for flush surface if necessary.		
6. Measured and cut panel.		
7. Placed first panel in corner.		
8. Checked for plumb.		
9. Scribed and fitted panel.		
10. Glued first panel.		
11. Nailed first panel.		
12. Butted second panel to first panel.		
13. Laid out window, door, and outlet box openings.		
14. Continued procedure until all wall panels have been installed.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 133

TASK

Assemble prefabricated cabinet

STANDARD OF PERFORMANCE OF TASK

Prefabricated cabinet must be assembled in accordance with manufacturer's instructions. Frame and drawers must be square; drawers must open and close without sticking or wobbling.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Manufacturer's instructions
Prefabricated cabinet with hardware

ENABLING OBJECTIVES

1. Interpret manufacturer's instructions.
2. Measure, mark, and cut accurately.
3. Plumb and level using a level.

RESOURCE

Capotosto. **Residential Carpentry**, pp. 347-361.

TEACHING ACTIVITIES

1. Have students read and discuss **Residential Carpentry**, pp. 347-361.
2. Discuss the tools and materials to be used in assembling prefabricated cabinets.
3. Demonstrate the various parts and joints used in cabinets.
4. Show how to measure and arrange cabinets in order to have an efficient kitchen.
5. Explain why it is necessary for cabinets to be level and plumb.
6. Orally review manufacturer's instructions on assembling cabinets.
7. Demonstrate the assembly of prefabricated cabinets.

PERFORMANCE OBJECTIVE 133

CRITERION-REFERENCED MEASURE

Questions

1. Cabinets secured to the wall are called ___________.
2. Cabinets resting on the floor are called ___________.
3. Cabinets should be leveled by using a ___________.

Answers

1. Wall
2. Base
3. Level

Practical Application

The students assemble prefabricated cabinets in accordance with manufacturer's instructions.

Method of Evaluating Practical Application

Use Checklist Performance Objective 133 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 133 EVALUATION

ASSEMBLING PREFABRICATED CABINETS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Unpacked prefabricated cabinet.		
2. Checked parts with packing list.		
3. Read manufacturer's instructions.		
4. Trial-assembled cabinet components: a. back b. base frame c. bottom d. division e. drawer f. drawer frame g. drawer guides h. ends i. face frame j. top		
5. Squared and aligned components.		
6. Disassembled components.		
7. Assembled components according to manufacturer's instructions.		
8. Checked drawers and doors for fit and adjusted if necessary.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 134

TASK

Install closet accessories

STANDARD OF PERFORMANCE OF TASK

Shelf must be level and rod must be securely fastened to side wall cleats. All joints must fit with no gaps; and there must be no hammer marks or splintering of finished wood.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Nails
Plans and specifications
Rod
Rod and shelf support
Shelf
Shelf cleats

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Measure, mark, and cut accurately.

RESOURCE

Feirer. **Carpentry and Building Construction**, p. 947.

TEACHING ACTIVITIES

1. Have students read and discuss **Carpentry and Building Construction**, p. 947.
2. Restate the value of having good shelving and clothes rods.
3. Explain the correct height of closet shelf and clothes rod.
4. Demonstrate the correct method of measuring the length of the closet shelf.
5. Demonstrate how to measure for rod, shelf, and hook strip.
6. Demonstrate the necessity of having the shelf and clothes rod at the proper height in relation to the door opening.
7. Demonstrate the installation and leveling of closet accessories.

PERFORMANCE OBJECTIVE 134

CRITERION-REFERENCED MEASURE

Questions

1. The shelf and clothes rod shall always be ___________.
2. The shelf supports are called ___________ ___________.
3. The proper height is usually ___________.

Answers

1. Level
2. Hook strips
3. 66 inches

Practical Application

Have students install closet shelves and closet clothes rod. Closet shelves and rods must be secured and level, free of hammer marks, and splintered wood.

Method of Evaluating Practical Application

Use Checklist Performance Objective 134 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 134 EVALUATION

INSTALLING A CLOSET SHELF AND CLOTHES ROD

Student's Name ____________________ Date ____________________

DIRECTIONS TO STUDENT: Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR: Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for location of shelf cleats.		
2. Marked locations of shelf cleats on back wall.		
3. Marked level line on back wall and side walls.		
4. Cut shelf cleats.		
5. Fitted shelf cleats.		
6. Fastened cleats to walls.		
7. Cut shelf.		
8. Fitted shelf.		
9. Fastened shelf to cleats.		
10. Attached rod and shelf support if necessary.		
11. Adjusted closet rod to fit between side wall cleats.		
12. Fastened rod to cleats on side walls of closet.		
13. Checked rod and shelf for level.		

APPROVED: YES _____ NO _____

Evaluator's Signature ____________________ Date ____________________

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 135

TASK

Install interior door jamb

STANDARD OF PERFORMANCE OF TASK

Door jamb must be square, plumb, level, and straight.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Door jamb
Interior door
Nails
Plans and specifications
Rough opening
Shim shingles
Straightedge

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Measure, mark, and cut accurately.
3. Plumb, level, and square using a level and string.

RESOURCE

Feirer. **Carpentry and Building Construction**, pp. 907-920.

TEACHING ACTIVITIES

1. Have students read and discuss **Carpentry and Building Construction**, pp. 907-920.
2. Demonstrate the use of shims for plumbing door jambs.
3. Have a student locate a door opening from blueprint.
4. Have a student correctly identify the correct rough opening for any given size door.
5. Demonstrate how to install an interior door jamb that is plumb, level, square, and straight.

PERFORMANCE OBJECTIVE 135

CRITERION-REFERENCED MEASURE

Questions

1. The thickness of the finished wall will determine the width of the door ___________.
2. The item used to level the jamb is called a ___________.
3. The top section of a jamb is called a ___________.

Answers

1. Jamb
2. Shim
3. Head jamb

Practical Application

Have students install an interior door jamb. The jamb must be square, plumb, level, and straight.

Method of Evaluating Practical Application

Use Checklist Performance Objective 135 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 135 EVALUATION

INSTALLING INTERIOR DOOR JAMBS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications.		
2. Compared size of door jamb with interior door.		
3. Nailed head jamb into dadoes of side jambs.		
4. Set jamb in rough opening.		
5. Shimmed side jambs at head.		
6. Checked head jamb for level and square.		
7. Shimmed side jambs at head and nail.		
8. Plumbed hinge side of jamb and nail.		
9. Shimmed jamb at hinges and nail.		
10. Plumbed latch side of jamb and nail.		
11. Shimmed jamb straight and nail.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 136

TASK

Construct built-in cabinet

STANDARD OF PERFORMANCE OF TASK

Dimensions of built-in cabinet must be according to plans and specifications. All joints must fit with no gaps; and there must be no hammer marks or splintering of finished wood.

SOURCE OF STANDARD

Residential Carpentry, p. 625.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Finish stock
Miter box
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Interpret from plans, dimensions of built-in cabinets.
2. Measure, mark, and cut accurately.
3. Use standard tool kit.

RESOURCE

Capotosto. **Residential Carpentry**, pp. 350-361.

TEACHING ACTIVITIES

1. Have students read and discuss **Residential Carpentry**, pp. 350-361.
2. Demonstrate how to locate wall studs, and joist, so the cabinets can be fastened.
3. Have a student locate wall studs and joist.
4. Describe the difficulties that can be encountered in assembling built-in cabinets.
5. Explain the importance of finished cabinet's appearance.
6. Demonstrate the construction of built-in cabinet.

PERFORMANCE OBJECTIVE 136

CRITERION-REFERENCED MEASURE

Questions

1. When constructed in place, the built-in cabinets are fastened to ___________.
2. Built-in cabinets are considered to be ___________.
3. Working out the details and the materials list for built-in cabinets is the responsibility of the ___________.

Answers

1. Wall studs and joist
2. Custom made
3. Carpenter

Practical Application

Have students construct built-in cabinets according to plans and specifications. All joints must fit with no gaps and there must be no hammer marks or splintering of finished wood.

Method of Evaluating Practical Application

Use Checklist Performance Objective 136 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 136 EVALUATION

CONSTRUCTING BUILT-IN CABINETS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications for dimensions of unit.		
2. Checked size of rough openings.		
3. Ripped material from straight stock.		
4. Measured and cut sides from straight stock.		
5. Measured and cut back from straight stock.		
6. Rabbeted ends.		
7. Measured and cut front trim from finish stock.		
8. Mitered exposed sides of front trim.		
9. Assembled, glued, and nailed.		
10. Checked for square.		
11. Measured, cut, and installed shelving.		
12. Set nails.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 137

TASK

Install shelving

STANDARD OF PERFORMANCE OF TASK

Shelving must be installed in location specified on plans and specifications. Shelf standards must be plumb and shelf brackets must be level; shelf must be level, must not wobble. Support(s) must be installed when shelf extends beyond 3 feet.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Nails
Plans and specifications
Shelf brackets
Shelf standards
Straight stock

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Measure, mark, and cut accurately.
3. Use standard tool kit.

RESOURCE

Feirer. **Carpentry and Building Construction**, p. 947.

TEACHING ACTIVITIES

1. Review and discuss blueprints with class.
2. Describe material from which shelving will be made.
3. Restate the value of having shelving level and not wobbly.
4. Demonstrate how to measure for shelving.
5. Demonstrate how to level shelving.
6. Express the need of supports for shelves that extend beyond three feet.
7. Define the difference between adjustable and non-adjustable shelves.
8. Demonstrate how to install shelving.

PERFORMANCE OBJECTIVE 137

CRITERION-REFERENCED MEASURE

Questions

1. To prevent round objects from rolling from shelf the shelf must be __________.
2. Supports are required if the shelf extends beyond __________.
3. Shelves that are not stationary are called __________.

Answers

1. Level
2. 3 feet
3. Adjustable

Practical Application

Have students install shelving in locations specified on plans and specifications.

Method of Evaluating Practical Application

Use Checklist Performance Objective 137 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 137 EVALUATION

INSTALLING SHELVING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
Adjustable Shelving		
1. Checked location of shelving on plans and specifications.		
2. Plumbed and marked line for standards.		
3. Attached shelf standards to wall along line.		
4. Leveled standards.		
5. Attached shelf brackets.		
6. Cut shelving stock.		
7. Laid on bracket.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 137 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
Non-Adjustable Shelving		
1. Checked plans and specifications.		
2. Measured cleats.		
3. Cut cleats.		
4. Nailed cleats to side walls.		
5. Cut and nailed supports if necessary.		
6. Measured stock.		
7. Cut shelf.		
8. Laid shelf on cleats.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 138

TASK

Install baseboards

STANDARD OF PERFORMANCE OF TASK

Baseboard must butt tightly where wall and floor intersect; base must be installed in accordance with plans and specifications. All copes and miters must fit with no gaps; baseboards must be nailed to studs and bottom plate. All nails must be set.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Baseboard
Base shoe
Miter box
Nails
Plans and specifications

ENABLING OBJECTIVES

1. Use standard tool kit.
2. Interpret plans and specifications.
3. Measure, mark, and cut accurately.

RESOURCE

Feirer. **Carpentry and Building Construction**, pp. 937-943.

TEACHING ACTIVITIES

1. Have students read and discuss **Carpentry and Building Construction**, pp. 937-943.
2. Discuss the materials and tools to be used in the installation of baseboard.
3. Demonstrate how to use tools required to install baseboard.
4. Have a student select materials that are required to install a baseboard.
5. Demonstrate how to install baseboard.
6. Have a student demonstrate how to install baseboard.

CRITERION-REFERENCED MEASURE

Questions

1. Base molding is usually installed ___________.
2. Base molding is a finish between the finished wall and the ___________.
3. Base molding on a long wall should be joined on a ___________.

Answers

1. Last
2. Floor
3. Wall stud

Practical Application

Have students install baseboard with no gaps. Baseboards must be nailed to the studs and bottom plate, nails must be set.

Method of Evaluating Practical Application

Use Checklist Performance Objective 138 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 138 EVALUATION

INSTALLING BASEBOARDS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for base and shoe detail.		
2. Located studs and marked location on floor.		
3. Measured baseboard.		
4. Cut baseboard.		
5. Fitted first piece of baseboard where floor and wall meet.		
6. Nailed baseboard into studs and bottom plate.		
7. Brought next piece of base into corner.		
8. Coped joint.		
9. Mitered outside corners.		
10. Continued procedure until all baseboard is installed.		
11. Cut and fitted base to door casing.		
12. Set all nails.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 139

TASK

Install ceiling molding

STANDARD OF PERFORMANCE OF TASK

Inside corners must be coped; all outside corners must be mitered; copes and miters must fit with no gaps; and all nails must be set.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Ceiling molding
Miter box
Nails
Plans and specifications

ENABLING OBJECTIVES

1. Use a standard tool kit.
2. Interpret plans and specifications.
3. Measure, nail, and cut accurately.

RESOURCE

Feirer. **Carpentry and Building Construction**, pp. 943-944.

TEACHING ACTIVITIES

1. Have students read and discuss **Carpentry and Building Construction**, pp. 943-944.
2. Explain the difference between miter and cope cuts.
3. Demonstrate a miter and a cope cut.
4. Have a student demonstrate a miter cut.
5. Have a student demonstrate a cope cut.
6. Demonstrate how to install ceiling molding.

PERFORMANCE OBJECTIVE 139

CRITERION-REFERENCED MEASURE

Questions

1. Ceiling molding is secured by using a finish nail driven into the ___________.
2. Ceiling molding is cut and fit the same as ___________.
3. If ceiling and walls are different color, ceiling molding is used to make painting ___________.

Answers

1. Upper wall plates
2. Base molding
3. Easier

Practical Application

Have students install ceiling molding. Joints must be coped or mitered. Copes and miters must fit with no gaps.

Method of Evaluating Practical Application

Use Checklist Performance Objective 139 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 139 EVALUATION
INSTALLING CEILING MOLDING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for molding detail.		
2. Measured length of one long wall at ceiling.		
3. Measured and cut molding.		
4. Nailed molding in place.		
5. Coped second piece of molding to first piece.		
6. Cut and nailed molding until room is completed, coping inside corners and mitering outside corners.		
7. Set nails.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 140

TASK

Hang drywall

STANDARD OF PERFORMANCE OF TASK

Surfaces must be completely covered, smooth, and flush.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Adhesive
Drywall
Drywall nails
Key hole saw
Plans and specifications

ENABLING OBJECTIVES

1. Use standard tool kit.
2. Measure, mark, and cut accurately.

RESOURCE

Feirer. **Carpentry and Building Construction**, pp. 740-749.

TEACHING ACTIVITIES

1. Have students read and discuss **Carpentry and Building Construction**, pp. 740-749.
2. Discuss the materials and tools to be used in the installation of drywall.
3. Demonstrate how to measure and calculate the number of sheets of drywall required.
4. Have a student measure a given area and calculate the number of sheets of drywall required.
5. Demonstrate the cutting and installation of drywall.

PERFORMANCE OBJECTIVE 140

CRITERION-REFERENCED MEASURE

Questions

1. On a vertical edge the nails used for the installation of drywall will be nailed every ____________.
2. The edge of drywall must always fall on the center of a ____________.
3. When possible the factory edge of drywall should butt against a ____________.

Answers

1. Eight inches
2. Stud
3. Factory edge

Practical Application

Have students hang drywall. When completed, the surfaces will be completely covered, smooth and flush.

Method of Evaluating Practical Application

Use Checklist Performance Objective 140 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 140 EVALUATION

HANGING DRYWALL

Student's Name **Date**

DIRECTIONS TO STUDENT	Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.
DIRECTIONS TO EVALUATOR	Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for location and type of material to be used.		
2. Measured length of section to receive drywall.		
3. Measured width of section to receive drywall.		
4. Cut drywall to size.		
5. Measured locations of cutouts (outlets, plumbing, etc.).		
6. Cut holes for cutouts.		
7. Applied adhesive to studs. (NOTE: Do not use adhesive on metal studs.)		
8. Positioned drywall so that vertical joints fall over stud centers, butting factory edges when possible.		
9. Nailed drywall every 8 inches along vertical edges.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 140 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
10. Nailed top and bottom at each wall stud.		
11. Doubled nails at top center and bottom center of each wall stud.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 141

TASK

Case interior opening

STANDARD OF PERFORMANCE OF TASK

Bottom ends of side casing must be square and must rest on finished floor. Casing must have margin around edge of jamb. Miters must fit with no gaps. Casing must not be split where nailed; and all nails must be set.

SOURCE OF STANDARD

Modern Carpentry, p. 363.

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Casing
Finished nails
Miter box
Plans and specifications
Untrimmed door opening

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Measure, mark, and cut accurately.

RESOURCE

Durbahn. **Fundamentals of Carpentry**, pp. 430-445.

TEACHING ACTIVITIES

1. Instruct the students in the proper use of miter saw.
2. Identify the different types of materials to be used in casing.
3. Identify square and mitered cuts.
4. Show where the location of each cut will be used.
5. Explain the necessity of using the proper type finish nail.
6. Have the students mark casings to the specified length and angles.
7. Demonstrate the cutting and installation of casing.

PERFORMANCE OBJECTIVE 141

CRITERION-REFERENCED MEASURE

Questions

1. The correct nail to be used in fastening a casing is a ____________.
2. Each end of the head will be cut at an angle of ____________.
3. One end of the side casing is cut at 45 degrees and the other will be cut at ____________.

Answers

1. Finish nail
2. 45 degrees
3. 90 degrees

Practical Application

Have students case interior openings. The finished casing will have margin around the edge of the jamb, fit with no gaps, have no splits where nailed and nails must be set.

Method of Evaluating Practical Application

Use Checklist Performance Objective 141 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 141 EVALUATION

CASING INTERIOR OPENINGS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for type of casing.		
2. Laid out casing for sides and head.		
3. Cut casing.		
4. Squared bottoms of side casings.		
5. Marked jamb margin on jamb edge with pencil.		
6. Measured for head between pencil lines.		
7. Cut 45° miter on each end of head.		
8. Nailed head to jamb on pencil line.		
9. Held side casing in place and marked.		
10. Cut 45° miters on side casing.		
11. Fit side casing with block plane.		
12. Nailed side casing to jamb along pencil line.		
13. Nailed ends of miters.		
14. Nailed side casing to wall.		
15. Set all nails.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 142

TASK

Hang interior door

STANDARD OF PERFORMANCE OF TASK

Jambs must be plumb; hinges must be flush with jamb and door edge surface. Door must open and close freely; stop must be parallel to plane of door.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Casing material
Circular saw
Door
Door jamb material
Door stop material
Hinges
Lockset and hardware
Nails
Plans and specifications
Rough opening
Shim material

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Use circular saw safely.
3. Measure, mark, and cut accurately.
4. Plumb, square, and level.

RESOURCE

Durbahn. **Fundamentals of Carpentry**, pp. 437-450.

TEACHING ACTIVITIES

1. Have students discuss **Fundamentals of Carpentry**, pp. 437-450.
2. Have students locate all left hand doors in shop.
3. Explain the difference between a left hand and a right hand door.
4. Have students explain the differences between exterior and interior doors.
5. Demonstrate the use of shims to level and plumb a door.
6. Demonstrate the installation of a door.

PERFORMANCE OBJECTIVE 142

CRITERION-REFERENCED MEASURE

Questions

1. With your back against the hinges, a right hand door will swing to your ____________.
2. Small pieces of wood used behind the jamb to plumb a door are called ____________.
3. Interior doors normally require hinges totaling ____________.

Answers

1. Right
2. Shims
3. Two

Practical Application

Have students hang an interior door plumb. Door must operate smoothly.

Method of Evaluating Practical Application

Use Checklist Performance Objective 142 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 142 EVALUATION

HANGING AN INTERIOR DOOR PLUMB

Student's Name **Date**

DIRECTIONS TO STUDENT	Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.
DIRECTIONS TO EVALUATOR	Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Determined type and size of jambs and door from plans and specifications.		
2. Measured and cut head jamb to opening width.		
3. Measured and cut side jambs to opening length.		
4. Nailed jambs and jamb head together.		
5. Set assembly into opening.		
6. Plumbed sides and leveled head.		
7. Shimmed sides straight and plumb.		
8. Nailed jamb to studs through shims.		
9. Measured and cut door stop material.		
10. Nailed door stops in place temporarily.		
11. Planed door to width beveling lock side toward stop.		
12. Placed door in opening with wedges under and along sides to hold in position.		
13. Marked jamb and door stile simultaneously for hinges.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 142 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
14. Removed door and marked thickness of hinge at each hinge position on both jamb edge and door edge.		
15. Scored hinge cutouts using either the hinge itself or a butt gage.		

APPROVED: YES _____ NO ____

Evaluator's Signature Date

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 143

TASK

Installing a prehung door unit

STANDARD OF PERFORMANCE OF TASK

Door and jamb must be plumb; door must open and close freely without rubbing jamb.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Nails
Plans and specifications
Prehung door unit
Rough opening
Shim shingles

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Plumb, level, and square.

RESOURCE

Feirer. **Carpentry and Building Construction**, pp. 911-916.

TEACHING ACTIVITIES

1. Have students read and discuss **Carpentry and Building Construction**, pp. 911-916.
2. Show how to determine whether a door is right hand or left hand.
3. Explain the difference between split jamb and regular jamb units.
4. Instruct students on how to cut shims.
5. Demonstrate how to install a prehung door (split jamb).

PERFORMANCE OBJECTIVE 143

CRITERION-REFERENCED MEASURE

Questions

1. The disassembled half of a split door jamb, that contains the door is installed ____________.
2. Nails used in the installation are called ____________.
3. The side casings are nailed into the ____________.

Answers

1. First
2. Finish nails
3. Studs

Practical Application

Have students install a prehung door unit with split jamb. The door must be plumb, open and close freely.

Method of Evaluating Practical Application

Use Checklist Performance Objective 143 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 143 EVALUATION

INSTALLING A PREHUNG DOOR UNIT

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Separated jamb halves.		
3. Placed half containing door into opening.		
4. Placed wedges to center and held door in place.		
5. Adjusted shims until jamb was plumb.		
6. Nailed hinge side through shims.		
7. Adjusted gap between head jamb and door.		
8. Adjusted gap between lock side jamb and door.		
9. Fitted other jamb half into opposite side of opening.		
10. Checked door operation.		
11. Nailed casing into studs.		
12. Nailed door stop.		
13. Set nails.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

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DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 144

TASK

Install double-acting door

STANDARD OF PERFORMANCE OF TASK

Door must swing freely in both directions without rubbing jamb and must return to closed position.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Door
Framed doorway
Plans and specifications
Swivel spring hinge

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Use standard test kit.
3. Plumb, level, and square.

RESOURCE

Feirer. **Carpentry and Building Construction**, pp. 930-932.

TEACHING ACTIVITIES

1. Have students read and discuss **Carpentry and Building Construction**, pp. 930-932.
2. Describe the directions that double acting doors swing.
3. Demonstrate how to install floor plate to floor on hinge side of opening.
4. Discuss the necessity of checking the plumb and transferring the measurement from the jamb to the bottom pivot point to top of the door and the head jamb.
5. Have a student demonstrate how to install top plate at point marked on head jamb.
6. Demonstrate the installation of double acting door.

PERFORMANCE OBJECTIVE 144

CRITERION-REFERENCED MEASURE

Questions

1. Double-acting doors swing in ____________.
2. The top of double-acting door is usually ____________.
3. What allows the double-acting door to close is the ____________.

Answers

1. Two directions
2. Slightly below eye level
3. Hinges

Practical Application

Have students install a double-acting door. The door must swing freely both ways without rubbing jamb and must return to the closed position.

Method of Evaluating Practical Application

Use Checklist Performance Objective 144 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 144 EVALUATION

INSTALLING A DOUBLE-ACTING DOOR

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Installed hinge floor plate to floor on hinge side of opening.		
3. Placed door in opening and placed shims around perimeter to hold in position.		
4. Marked position of floor plate on bottom rail.		
5. Checked plumb and transferred measurement from jamb to bottom pivot point to top of door and to head jamb.		
6. Removed door and mortised top and bottom rails for hinge pivots.		
7. Installed top plate at point marked on head jamb		
8. Installed swivel hinges in mortises.		
9. Replaced door in opening and engaged hinge pivots in plates.		
10. Checked door operation and adjusted, if necessary.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 145

TASK

Install folding (accordian) door

STANDARD OF PERFORMANCE OF TASK

Door must be plumb, work smoothly, and close tightly against jamb.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Folding door
Folding door frame kit
Manufacturer's instructions
Plans and specifications

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Interpret manufacturer's instructions.
3. Measure, mark, and cut accurately.

RESOURCE

Feirer. **Carpentry and Building Construction**, pp. 920-930.

TEACHING ACTIVITIES

1. Have students read and discuss **Carpentry and Building Construction**, pp. 920-930.
2. Describe different types of doors.
3. Demonstrate where and how to position the top track on the head jamb.
4. Have a student read the manufacturer's instructions.
5. Demonstrate how to use plumb line for locating the position of bottom track.
6. Demonstrate installing bottom and top tracks.
7. Demonstrate installation of folding door.
8. Have students demonstrate installation of folding door.

PERFORMANCE OBJECTIVE 145

CRITERION-REFERENCED MEASURE

Questions

1. To install a folding door, first, install the ___________.
2. By using a bifold door the entire opening can be exposed at ___________.
3. Folding doors are installed in a ___________.

Answers

1. Top track
2. One time
3. Standard door frame

Practical Application

Have students install folding (accordian) doors. The doors must be plumb, work smoothly, and close tightly against the jamb.

Method of Evaluating Practical Application

Use Checklist Performance Objective 145 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 145 EVALUATION

INSTALLING FOLDING (ACCORDIAN) DOORS

Student's Name **Date**

DIRECTIONS TO STUDENT	Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.
DIRECTIONS TO EVALUATOR	Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Marked position of top track on head jamb.		
3. Installed top track as per manufacturer's instructions.		
4. Dropped plumb line from top track and marked position for bottom track on floor.		
5. Installed bottom track as per manufacturer's instructions.		
6. Assembled door unit and pivots as per manufacturer's instructions.		
7. Installed door on tracks.		
8. Checked operation and adjusted, if necessary.		
9. Installed latch.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 146

TASK

Install sliding door

STANDARD OF PERFORMANCE OF TASK

Doors must be plumb; must fit against side jambs; and must roll across track.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Door frame kit
Door panels
Hardware
Manufacturer's instructions
Plans and specifications

ENABLING OBJECTIVES

1. Use a standard tool kit.
2. Plumb, level, and square.

RESOURCE

Feirer. **Carpentry and Building Construction**, pp. 920-923.

TEACHING ACTIVITIES

1. Have students read and discuss **Carpentry and Building Construction**, pp. 920-923.
2. Describe different types of doors.
3. Identify what a sliding door is.
4. List tools needed to install sliding doors.
5. Demonstrate how to locate, from blueprint, required location of sliding door.
6. Demonstrate installation of sliding door hardware.
7. Explain the adjustment that can be made on sliding doors.
8. Demonstrate the installation of sliding doors.

PERFORMANCE OBJECTIVE 146

CRITERION-REFERENCED MEASURE

Questions

1. The first step of installing sliding doors is to install the ___________.
2. You can determine where to install the bottom track and guide by dropping a ___________.
3. If doors are installed properly they should fit against the side ___________.

Answers

1. Top track
2. Plumbline
3. Jambs

Practical Application

Have students install sliding doors. The doors must be plumb, fit against side jambs, and roll freely across tracks.

Method of Evaluating Practical Application

Use Checklist Performance Objective 146 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 146 EVALUATION

INSTALLING SLIDING DOORS

Student's Name **Date**

DIRECTIONS TO STUDENT: Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR: Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Assembled door frame as per manufacturer's instructions.		
3. Installed top track.		
4. Dropped plumb line from top track and marked position for bottom track or guide.		
5. Installed bottom track or guide.		
6. Installed rollers (glides) to doors.		
7. Placed doors in opening and engaged rollers in track as per manufacturer's instructions.		
8. Checked doors for plumb and fitted against jambs and adjusted if necessary.		
9. Installed decorative hardware.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

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DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 147

TASK

Install bi-fold door

STANDARD OF PERFORMANCE OF TASK

Doors must be plumb and slide smoothly in the track. Doors must fit against side jambs.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Bi-fold door unit
Door frame kit
Hardware
Plans and specifications

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Plumb, level, and square.

RESOURCE

Durbahn. **Fundamentals of Carpentry**, pp. 453-454.

TEACHING ACTIVITIES

1. Have students read and discuss **Fundamentals of Carpentry**, pp. 453-454.
2. Discuss simularity between different type doors.
3. Assemble top and bottom track to the head jamb and floor.
4. Assist a student to install pivots in top and bottom of slide door panel.
5. Illustrate the assembly of a bi-fold door.
6. Demonstrate the installation of a bi-fold door.

PERFORMANCE OBJECTIVE 147

CRITERION-REFERENCED MEASURE

Questions

1. The top track is installed to the ___________.
2. The top track and the bottom track should be ___________.
3. Pivots are installed on swinger door panels at the ___________.

Answers

1. Head jamb
2. Plumb
3. Top and bottom of the doors.

Practical Application

Have students install bi-fold doors. The doors must be plumb, slide smoothly in tracks, and fit against the side jambs.

Method of Evaluating Practical Application

Use Checklist Performance Objective 147 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 147 EVALUATION

INSTALLING BI-FOLD DOORS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Installed top track to head jamb.		
3. Dropped plumb line from top track and marked position for bottom track or bottom socket.		
4. Installed bottom track or bottom socket.		
5. Installed pivots in top and bottom of swinger door panel.		
6. Installed slide pin in top and bottom of slider door panel.		
7. Placed doors in opening, engaging all pivots and pins in hinges.		
8. Checked for plumb, fit, and adjusted, if necessary.		
9. Installed decorative hardware.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 148

TASK

Install pocket door

STANDARD OF PERFORMANCE OF TASK

Door must be plumb; must close firmly against jamb; and must operate smoothly.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Door panel
Hardware
Manufacturer's instructions
Plans and specifications
Pocket door frame kit
Rough opening

ENABLING OBJECTIVES

1. Interpret specifications from plans.
2. Measure, mark, and cut accurately.
3. Plumb, level, and square.

RESOURCE

Feirer. **Carpentry and Building Cosntruction**, pp. 926-932.

TEACHING ACTIVITIES

1. Have students read and discuss **Carpentry and Building Construction**, pp. 926-932.
2. Explain reason for using pocket doors.
3. Demonstrate the pocket door unit.
4. Explain why it is necessary to use the correct size nails.
5. Explain the uses of wedges to level and plumb the unit.
6. Demonstrate the installation of a pocket door.

PERFORMANCE OBJECTIVE 148

CRITERION-REFERENCED MEASURE

Questions

1. The reason for using a pocket door is to ___________.
2. If nails used are too long, they could damage the ___________.
3. The sliding door pocket frame comes complete and ready for ___________.

Answers

1. Save space
2. Door
3. Installation

Practical Application

Have students install a pocket door. The door must be plumb, close firmly against jamb, and operate smoothly.

Method of Evaluating Practical Application

Use Checklist Performance Objective 148 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 148 EVALUATION

INSTALLING A POCKET DOOR

Student's Name Date

DIRECTIONS TO STUDENT — Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR — Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Checked rough opening for size against requirements for door.		
3. Removed wood nailing strips from overhead track.		
4. Cut nailing strips to length according to door width.		
5. Replaced strips on track.		
6. Adjusted track length to rough opening.		
7. Drove nails partially into trimmer studs at height specified in manufacturer's instructions.		
8. Hung track on nails.		
9. Checked level of track and drove nails.		
10. Positioned split jamb and secured to track with screws.		
11. Positioned split stud and secured to track with screws.		

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CHECKLIST FOR PERFORMANCE OBJECTIVE 148 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
12. Plumbed both jamb and split stud and secured to floor.		
13. Attached roller assemblies to top of door panel as per manufacturer's instructions.		
14. Lifted door into pocket and engaged rollers in track.		
15. Adjusted door height and plumbed with adjusting screws.		
16. Installed door guides to split jamb.		
17. Installed rubber bumper to split stud.		
18. Checked operation of door and made any needed adjustments.		
19. Installed handle.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 149

TASK

Install cylinder lockset

STANDARD OF PERFORMANCE OF TASK

Door must close freely and lock must hold door firmly.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Awl
Cylinder lockset
Electric drill and bits
Installed door unit
Plans and specifications

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Use electric drill and hole saw.
3. Measure, mask, and cut accurately.

RESOURCE

Feirer. **Carpentry and Building Cosntruction**, pp. 641-653.

TEACHING ACTIVITIES

1. Have students read and discuss **Carpentry and Building Construction**, pp. 641-653.
2. Demonstrate the use of the template.
3. Explain the importance of reading instructions prior to boring any holes.
4. Review the parts of a cylinder lockset and explain the purpose of each part.
5. Demonstrate the installation of a cylinder lockset.

PERFORMANCE OBJECTIVE 149

CRITERION-REFERENCED MEASURE

Questions

1. The template shows you where to ___________.
2. Due to manufacturers making cylinders different sizes you should always ___________.
3. Be sure that all screws are ___________.

Answers

1. Bore holes
2. Read instructions
3. Tight

Practical Application

Have students install a cylinder lockset. The door must close freely and lock must hold door firmly.

Method of Evaluating Practical Application

Use Checklist Performance Objective 149 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 149 EVALUATION

INSTALLING A CYLINDER LOCKSET

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Wedged door open.		
3. Measured up from floor to mark position for knob.		
4. Applied lockset template to door.		
5. Marked centers of holes in face and edge of stile.		
6. Bored hole from outside through door as specified in manufacturer's instructions.		
7. Bored hole in edge of door for latchbolt as per manufacturer's instructions.		
8. Scored outline of latchbolt plate on door edge.		
9. Chiseled out mortise for latchbolt plate.		
10. Inserted latchbolt and screwed plate into door.		
11. Disassembled knob unit.		
12. Slipped outside half through hole, sliding machine screws, spindle, and locking bar through holes in latchbolt.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 149 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
13. Aligned inside knob half with spindle and locking bar.		
14. Tightened screws.		
15. Removed door wedge and checked operation of assembly.		
16. Closed door and marked position of strike plate on jamb.		
17. Chiseled out mortise for strike plate.		
18. Screwed strike plate into jamb.		
19. Checked lockset operation.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 150

TASK

Install mortise lockset

STANDARD OF PERFORMANCE OF TASK

Door must close and latch freely; and lock must fit mortise tightly.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Electric drill and bits
Installed door unit
Mortise lockset
Plans and specifications

ENABLING OBJECTIVES

1. Measure, mark, and cut accurately.
2. Interpret plans and specifications.
3. Use drill and hole saw safely.

RESOURCE

Durbahn. **Fundamentals of Carpentry**, pp. 450-452.

TEACHING ACTIVITIES

1. Have students read **Fundamentals of Carpentry**, pp. 450-452.
2. Demonstrate how to select location for mortise locksets from plans and specifications.
3. Illustrate how to mark the door for installation of mortise lockset.
4. Have a student show how to install strike plate.
5. Explain how to adjust the mortise lockset.
6. Demonstrate how to install mortise lockset.

PERFORMANCE OBJECTIVE 150

CRITERION-REFERENCED MEASURE

Questions

1. Mortise locksets are usually used on ___________.
2. The only part of a mortise lockset visible from outside is the ___________.
3. Like many other locksets you can determine where to mark the center of the holes to be bored by using the ___________.

Answers

1. Front entrance doors
2. Lock cylinder
3. Template (furnished with the lock set.)

Practical Application

Have students install a mortise lockset. The door must close and latch freely and lock must fit mortise tightly.

Method of Evaluating Practical Application

Use Checklist Performance Objective 150 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 150 EVALUATION

INSTALLING A MORTISE LOCKSET

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Measured from floor to location of lock.		
3. Held lock in position and marked outline on edge of door.		
4. Marked location of spindle and keyhole on side of door.		
5. Bored holes for spindle and keyhole with drill.		
6. Bored series of overlapping holes, depth equal to width of lock and height equal to height of lock between marks on edge of door.		
7. Chiseled out sides to square mortise.		
8. Inserted lock into mortise.		
9. Marked outline of lockface on door edge.		
10. Removed lock and chiseled out area to a depth equal to thickness of lock plate.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 150 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
11. Installed lock with screws supplied.		
12. Closed door and marked position of latch on door jamb.		
13. Held strike plate at this position and marked outline on jamb.		
14. Chiseled out jamb for strike plate.		
15. Installed strike plate with screws supplied.		
16. Checked operation of door and adjusted if necessary.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 151

TASK

Install closer

STANDARD OF PERFORMANCE OF TASK

Door must close smoothly and slowly without banging.

SOURCE OF STANDARD

Writing Team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Closer
Closer hardware kit
Door
Manufacturer's instructions
Plans and specifications

ENABLING OBJECTIVES

1. Explain reasons for installing door closers.
2. List where and why closers can be a necessity.
3. Relate the reasons for different size door closers.

RESOURCE

Watson. **Construction Materials and Processes**, pp. 246-248.

TEACHING ACTIVITIES

1. Have students read and discuss **Construction Materials and Processes**, pp. 246-248.
2. Compare the difference of a door closing with a vacuum to a door closing without a vacuum.
3. Express the importance of selecting specified screws for installation.
4. Have a student choose proper tension of a door closer.
5. Demonstrate how to install a door closer.
6. Have students demonstrate how to install and adjust a door closer.

PERFORMANCE OBJECTIVE 151

CRITERION-REFERENCED MEASURE

Questions

1. The anchor plate is installed on the ___________.
2. The closer is installed between the ___________.
3. Most closers allow the door to open ___________.

Answers

1. Hinge side of door jamb
2. Anchor plate and the swinger plate
3. 100 degrees

Practical Application

Have students install a closer. The door will close smoothly, and slowly without banging.

Method of Evaluating Practical Application

Use Checklist Performance Objective 151 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 151 EVALUATION

INSTALLING A CLOSER

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications.		
2. Located and marked position of anchor plate on hinge side of door jamb as per manufacturer's instructions.		
3. Installed anchor plate with screws provided.		
4. Located and marked position of swinger plate on door as per manufacturer's instructions.		
5. Installed swinger plate with screws provided.		
6. Closed door and installed closer between anchor and swinger.		
7. Checked operation of door and adjusted closer tension as per manufacturer's instructions.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 152

TASK

Install door holder

STANDARD OF PERFORMANCE OF TASK

Holder must be secure and must hold door in any desired position.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Electric drill and bits
Holder
Installed door unit
Manufacturer's instructions
Plans and specifications
Screws

ENABLING OBJECTIVES

1. Interpret from plans the specifications and location of the holder on the door.
2. Choose the location for the screws to install the holder.

RESOURCE

Watson. **Construction Materials and Processes**, pp. 248-249.

TEACHING ACTIVITIES

1. Have students read and discuss **Construction Materials and Processes**, pp. 248-249.
2. Show different types of door holders.
3. Describe the purpose for installing door holders.
4. Have a student tell the reasons for using door holders.
5. Demonstrate how to install door holders.
6. Explain why some door holders are installed with the door closer.

PERFORMANCE OBJECTIVE 152

CRITERION-REFERENCED MEASURE

Questions

1. The door holder should secure the door in ____________.
2. Before installing the screws you should bore ____________.
3. The location of the holder on the door can be determined by the ____________.

Answers

1. Any position
2. Pilot holes
3. Manufacturer's instructions

Practical Application

Have students install a door holder. The holder must be secure and hold door in any desired position.

Method of Evaluating Practical Application

Use Checklist Performance Objective 152 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 152 EVALUATION

INSTALLING A DOOR HOLDER

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications.		
2. Determined location of holder on door as per manufacturer's instructions.		
3. Placed holder in position and marked location of screw holes.		
4. Selected bit and drilled pilot holes.		
5. Placed holder over screw holes and drove wood screws into door.		
6. Checked holder operation in different positions and adjusted if necessary.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 153

TASK

Install panic bar

STANDARD OF PERFORMANCE OF TASK

Panic bar must operate in accordance with manufacturer's instructions and door must open and close without sticking.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Electric drill and bits
Hardware
Hung door
Panic bar with manufacturer's instructions
Plans and specifications

ENABLING OBJECTIVES

1. Identify specifications from plans.
2. Tell what purpose the manufacturer's instructions serve.
3. Apply instructions during the installation of panic bar.

RESOURCE

Watson. **Construction Materials and Processes**, pp. 248-249.

TEACHING ACTIVITIES

1. Have students read and discuss **Construction Materials and Processses**, pp. 248-249.
2. Question students about where they have seen panic bars installed.
3. Have the students determine if they are required at the locations they gave.
4. Explain what the locations had in common.
5. Discuss how panic bars and fire regulations have a connection.
6. Illustrate how to install panic bar.

PERFORMANCE OBJECTIVE 153

CRITERION-REFERENCED MEASURE

Questions

1. Panic bars should not be locked in any manner to prevent them from being opened from the ___________.
2. If a door is classified as 3-H it will stay latched for a period of ___________.
3. Panic bars are usually installed the same height as the regular door ___________.

Answers

1. Inside
2. 3 hours
3. Knob

Practical Application

Have students install a panic bar in accordance with manufacturer's instructions. When completed door must open and close without sticking.

Method of Evaluating Practical Application

Use Checklist Performance Objective 153 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 153 EVALUATION

INSTALLING A PANIC BAR

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Located and marked all screw holes as per manufacturer's instructions.		
3. Selected bit size and drilled all holes as marked.		
4. Located and marked mortises in jamb and floor as per manufacturer's instructions.		
5. Drilled mortise holes.		
6. Assembled panic bar and locking mechanism as per manufacturer's instructions.		
7. Installed assembly and hardware.		
8. Checked operation of door and adjusted if necessary.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 154

TASK

Install flush bolt

STANDARD OF PERFORMANCE OF TASK

Bolt must engage receiver smoothly and must not interfere with door swing when retracted.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Electric drill and bits
Flush bolt
Installed door
Manufacturer's instructions
Plans and specifications
Screws

ENABLING OBJECTIVES

1. Choose the tools to be used.
2. Measure the desired height of flush bolt.

RESOURCE

Watson. **Construction Materials and Processes**, pp. 249-250.

TEACHING ACTIVITIES

1. Have students read and discuss **Construction Materials and Processes**, pp. 249-250.
2. Recognize the purpose a flush bolt serves.
3. Review the manufacturer's instructions and specifications.
4. Have a student show how to drill pilot holes for installation of flush bolt.
5. Install and explain the procedures of installing a flush bolt.

PERFORMANCE OBJECTIVE 154

CRITERION-REFERENCED MEASURE

Questions

1. The function of latches and catches such as flush bolts is to hold the door in a ___________.
2. The receiver is mounted to the ___________.
3. Before installing the wood screws you should bore ___________.

Answers

1. Closed position
2. Door jamb
3. Pilot holes

Practical Application

Have students install a flush bolt. The bolt must engage receiver smoothly and not interfere with door swing when retracted.

Method of Evaluating Practical Application

Use Checklist Performance Objective 154 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 154 EVALUATION

INSTALLING A FLUSH BOLT

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Determined bolt height on door.		
3. Held retracted flush bolt as predetermined height to edge of door.		
4. Marked position of screw holes.		
5. Selected bit and drilled pilot holes.		
6. Installed bolt to door with wood screws.		
7. Closed door and marked position of receiver of jamb.		
8. Closed mortise for receiver.		
9. Drilled pilot holes for receiver.		
10. Installed receiver to jamb with wood screws.		
11. Closed door and checked operation of bolt assembly; adjusted if necessary.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 155

TASK

Install door plate

STANDARD OF PERFORMANCE OF TASK

Plate must be tight to door; must be placed squarely; and screw holes must be evenly spaced.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Door
Door plate
Electric drill and bits
Plans and specifications
Screws

ENABLING OBJECTIVES

1. Interpret from blueprints or specifications where the door plates are to be installed.
2. List the reasons for using door plates.

RESOURCE

Wagner. **Modern Carpentry**, pp. 432-434.

TEACHING ACTIVITIES

1. Read and discuss **Modern Carpentry**, pp. 432-434.
2. Have students give reasons for installing door plates.
3. Demonstrate how to adjust the door plate.
4. Describe the various types of door plates.
5. Demonstrate how to install the door plate.

PERFORMANCE OBJECTIVE 155

CRITERION-REFERENCED MEASURE

Questions

1. Door plates are required on ___________.
2. Present day thresholds are usually equipped with strips of ___________.
3. Instructions for installation are furnished by the ___________.

Answers

1. Exterior doors
2. Rubber
3. Manufacturer

Practical Application

Have students install a door plate. The plate must be tight to the door, placed squarely, and screwed holes must be evenly spaced.

Method of Evaluating Practical Application

Use Checklist Performance Objective 155 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 155 EVALUATION

INSTALLING A DOOR PLATE

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications for location of door plate.		
2. Selected bit and drilled evenly spaced holes around perimeter of plate.		
3. Held plate in position on door and drove screws through holes into door panel.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 156

TASK

Install weatherstripping

STANDARD OF PERFORMANCE OF TASK

Weatherstripping must allow door to close and must seal out air around door edges.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Plans and specifications
Tacks
Weatherstripping

ENABLING OBJECTIVES

1. Select type of weatherstrip to be used.
2. Judge the value of weatherstripping.
3. Show necessity of proper installation.

RESOURCE

Drake. **Weatherizing Your Home**, pp. 187-192.

TEACHING ACTIVITIES

1. Have students read and discuss **Weatherizing Your Home**, pp. 187-192.
2. Explain locations for weatherstripping.
3. Have a student measure area to be weatherstripped.
4. Demonstrate marking and cutting desired length of weatherstripping.
5. Illustrate how to weatherstrip the complete door.
6. Discuss and review the values of weatherstripping.

PERFORMANCE OBJECTIV 156

CRITERION-REFERENCED MEASURE

Questions

1. The side pieces of weatherstripping will be equal to the jamb ___________.
2. The weatherstripping is installed to the ___________.
3. The doors that should always be weatherstripped are ___________.

Answers

1. Height
2. Jamb
3. Exterior doors

Practical Application

Have students install weatherstripping. The door will close, but seal out air around door edges.

Method of Evaluating Practical Application

Use Checklist Performance Objective 156 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 156 EVALUATION

INSTALLING WEATHERSTRIPPING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Measured height of door jamb.		
3. Cut length of weatherstripping equal to jamb height.		
4. Placed weatherstripping on jamb to inside of door stop.		
5. Tacked weatherstripping in place.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 157

TASK

Install wall cabinet

STANDARD OF PERFORMANCE OF TASK

Cabinet must be level and tight to surface and any adjacent cabinets.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Bolts
Cabinet
Electric drill and bits
Manufacturer's instructions
Nuts
Shims
Washers
Wood screws

ENABLING OBJECTIVES

1. Select wall cabinet to be installed.
2. Locate the location for the installation.
3. Use a level.

RESOURCE

Feirer. **Carpentry and Building Construction**, pp. 867-869.

TEACHING ACTIVITIES

1. Have students read **Carpentry and Building Construction**, pp. 867-869.
2. Locate studs in the walls for fastening wall cabinet.
3. Demonstrate the different type of fasteners that can be used to install wall cabinets.
4. Have a student drill shank holes through the wall cabinet.
5. Demonstrate the installation of wall cabinet.

PERFORMANCE OBJECTIVE 157

CRITERION-REFERENCED MEASURE

Questions

1. The cabinets must be installed ____________.
2. The wall cabinet must be firmly secured to the ____________.
3. When securing wall cabinets, never use ____________.

Answers

1. Level
2. Wall
3. Nails

Practical Application

Have students install wall cabinets. The cabinets must be level and tight to surface and any adjacent cabinets.

Method of Evaluating Practical Application

Use Checklist Performance Objective 157 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 157 EVALUATION

INSTALLING WALL CABINETS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for location of cabinet.		
2. Measured and marked cabinet position.		
3. Drilled shank holes through cabinet.		
4. Set cabinet in position.		
5. Leveled cabinet.		
6. Screwed cabinet to surface with wood screws.		
7. Checked tiles for fit and adjusted if necessary.		
8. Drilled shank/pilot holes at top and bottom edge of side cabinet stiles.		
9. Screwed cabinet stiles together.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 158

TASK

Install base cabinet

STANDARD OF PERFORMANCE OF TASK

Cabinet must be level and securely fastened.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Cabinet
Electric drill and bits
Manufacturer's instructions
Shims
Wood screws

ENABLING OBJECTIVES

1. Choose from plans, specifications and location of base cabinet.
2. Select necessary type of fasteners needed to install base cabinets.

RESOURCE

Baker. **Carpentry Fundamentals**, pp. 348-350.

TEACHING ACTIVITIES

1. Have students read **Carpentry Fundamentals**, pp. 348-350.
2. Review plans to collect the specifications and location of base cabinet.
3. Have a student compare different types of cabinets.
4. Demonstrate how to use shims to level base cabinets.
5. Illustrate the installation of base cabinet.

PERFORMANCE OBJECTIVE 158

CRITERION-REFERENCED MEASURE

Questions

1. Base cabinet can be leveled by using ___________.
2. Base cabinets should be secured with ___________.
3. Base cabinets don't have to be as secured as ___________.

Answers

1. Shims
2. Wood screws
3. Wall cabinets

Practical Application

Have students install base cabinets. The cabinets must be level and securely fastened.

Method of Evaluating Practical Application

Use Checklist Performance Objective 158 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 158 EVALUATION

INSTALLING BASE CABINETS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications for location of cabinet.		
2. Set cabinet in position and marked.		
3. Shimmed underneath cabinet if necessary.		
4. Leveled cabinet.		
5. Located specified surface.		
6. Drilled shank holes through cabinet braces.		
7. Screwed cabinet to surface with wood screws.		
8. Checked stiles for fit and adjusted if necessary.		
9. Drilled shank/pilot holes at top front and bottom front of cabinet stiles.		
10. Screwed cabinet stiles together.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 159

TASK

Install recessed medicine cabinet

STANDARD OF PERFORMANCE OF TASK

Medicine cabinet must be level and plumb; medicine cabinet must be secure in wall opening with flanges tight to wall on all sides.

SOURCE OF STANDARD

Residential Carpentry, p. 659.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Manufacturer's instructions
Medicine cabinet
Plans and specifications
Rough opening
Screws
Shims
Straight stock
Washers

ENABLING OBJECTIVES

1. Identify distance between studs.
2. Demonstrate framing skill for installation of recessed medicine cabinet.

RESOURCE

Feirer. **Guide to Residential Carpentry**, p. 128.

TEACHING ACTIVITIES

1. Read and discuss **Guide to Residential Carpentry**, p. 128.
2. Demonstrate cabinet fit between studs.
3. Apply necessary blocking supports for medicine cabinet.
4. Show how to measure and level for installation of recessed medicine cabinet.
5. Demonstrate the securing of recessed medicine cabinet from the inside to the walls and blocks.
6. Have a student demonstrate how to install a recessed medicine cabinet.

PERFORMANCE OBJECTIVE 159

CRITERION-REFERENCED MEASURE

Questions

1. Recessed medicine cabinets are secured to walls from the ___________.
2. Recessed medicine cabinets are made to normally fit between ___________.
3. The tops and bottoms are supported with ___________.

Answers

1. Inside
2. Studs
3. Blocks

Practical Application

Have the students install a recessed medicine cabinet. The cabinet must be secured in wall opening with all flanges tight to wall on all sides.

Method of Evaluating Practical Application

Use Checklist Performance Objective 159 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 159 EVALUATION

INSTALLING RECESSED MEDICINE CABINET

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications for location of cabinet.		
2. Determined dimensions of rough opening needed for cabinet from manufacturer's instructions.		
3. Compared dimensions of rough opening and dimensions of cabinet, adjusting rough opening as necessary.		
4. Checked opening for square.		
5. Removed sliding doors, but not hinged doors, of cabinet.		
6. Fitted cabinet into opening with cabinet flange flush against wall on all sides.		
7. Leveled and plumbed cabinet.		
8. Shimmed as required.		
9. Attached cabinet to studs with screws and washers.		
10. Inserted sliding doors.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 160

TASK

Install threshold

STANDARD OF PERFORMANCE OF TASK

Threshold must meet bottom of closed door without gaps and must seal out air at bottom of door.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Electric drills and bits
Manufacturer's instructions
Plans and specifications
Screws
Sealant
Threshold

ENABLING OBJECTIVES

1. Locate the location for the threshold to be installed.
2. Select the necessary size of threshold needed.
3. Identify direction of installation.

RESOURCE

Feirer. **Carpentry and Building Construction**, pp. 641-644.

TEACHING ACTIVITIES

1. Read and discuss **Carpentry and Building Construction**, pp. 641-644.
2. Demonstrate how to measure and calculate threshold size.
3. Have a student explain the corect way the threshold should be installed and why.
4. Demonstrate the installation of threshold.

PERFORMANCE OBJECTIVE 160

CRITERION-REFERENCED MEASURE

Questions

1. Thresholds are installed at exterior ___________.
2. The length of the threshold is determined by measuring the width of the ___________.
3. Seal the threshold to the floor by applying a bead of ___________.

Answers

1. Doors
2. Door opening
3. Sealant

Practical Application

Have students install threshold. The threshold must meet bottom of closed door without gaps, and seal out air at bottom of door.

Method of Evaluating Practical Application

Use Checklist Performance Objective 160 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 160 EVALUATION

INSTALLING THRESHOLD

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications.		
2. Measured width of door opening.		
3. Cut threshold to fit.		
4. Set threshold in place.		
5. Drilled pilot holes in floor for screws.		
6. Applied bead of sealant to floor.		
7. Drove anchors into holes if floor is concrete.		
8. Screwed threshold to floor.		
9. Adjusted threshold to fit tightly at bottom of door as per manufacturer's instructions.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 161

TASK

Install gypsum lath

STANDARD OF PERFORMANCE OF TASK

Lath must be nailed at each stud or joist crossing and nails must be driven just below paper surface.

SOURCE OF STANDARD

Modern Carpentry, pp. 308-309.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Framed wall
Gypsum lath
Nails
Plans and specifications

ENABLING OBJECTIVES

1. Measure area to be covered with gypsum lath.
2. Select size of gypsum lath to be used.

RESOURCE

Koel. **Carpentry**, pp. 490-495.

TEACHING ACTIVITIES

1. Read and discuss **Carpentry**, pp. 490-495.
2. Demonstrate how to measure gypsum lath for cuts.
3. Demonstrate how to mark and make the necessary cuts.
4. Have a student measure, mark, and cut gypsum lath.
5. Illustrate how to nail gypsum lath, the locations, and the design or pattern of nails.
6. Have students demonstrate how to install gypsum lath.

PERFORMANCE OBJECTIVE 161

CRITERION-REFERENCED MEASURE

Questions

1. Gypsum lath should be nailed at every ___________.
2. The nail head should be just below the ___________.
3. Nails should not exceed a maximum of ___________.

Answers

1. Stud or joist crossing
2. Paper surface
3. 8 inches apart

Practical Application

Have students install gypsum lath. The lath must be nailed at each stud or joist crossing and nails must be driven just below paper surface.

Method of Evaluating Practical Application

Use Checklist Performance objective 161 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 161 EVALUATION

INSTALLING GYPSUM LATH

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for type and thickness of lath.		
2. Cut lath to length.		
3. Set lath in place along bottom of framing.		
4. Nailed lath to each stud.		
5. Butted second piece of lath to edge of preceding piece.		
6. Nailed lath to studs.		
7. Continued installation until wall or ceiling surface is covered.		
8. Staggered vertical (butt) joints to different studs on alternate rows.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 162

TASK

Install corner beading

STANDARD OF PERFORMANCE OF TASK

Corner beading must be straight and extend outside of wall plane.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Corner beading
Gypsum lath
Plans and specifications
Ring shank nails

ENABLING OBJECTIVES

1. Describe where corner beading will be installed.
2. Explain purpose of using corner beading.
3. Measure corner that will require corner beading.

RESOURCE

Watson. **Construction Materials and Processes**, p. 283.

TEACHING ACTIVITIES

1. Read and discuss **Construction Materials and Processes**, p. 283.
2. Discuss different types of corner beading.
3. Explain the purpose for using corner beading.
4. Demonstrate how to install corner beading.
5. Have a student demonstrate how to install corner beading.

PERFORMANCE OBJECTIVE 162

CRITERION-REFERENCED MEASURE

Questions

1. Corner beads fit over ____________.
2. Use corner beading on walls made of ____________.
3. Nail corner beading along each ____________.

Answers

1. Exterior corners
2. Gypsum lath
3. Edge

Practical Application

Have students install corner beading. It must be straight and extending outside of wall plane.

Method of Evaluating Practical Application

Use Checklist Performance Objective 162 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 162 EVALUATION

INSTALLING CORNER BEADING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications.		
2. Cut corner beading to length.		
3. Set corner beading in place, extending outside wall planes.		
4. Nailed corner beading along each edge.		
5. Butted ends when necessary.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 163

TASK

Install plaster grounds

STANDARD OF PERFORMANCE OF TASK

Plaster grounds must surround all doors, windows, and other wall openings; must extend 3/4 inches from wall; must be plumbed at door opening; and must conform to width of door jamb to allow good fit for casing.

SOURCE OF STANDARD

Modern Carpentry, p. 310.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Furring
Nails
Plans and specifications
Plaster grounds
Wall to be plastered

ENABLING OBJECTIVES

1. Use standard tool kit.
2. Interpret finish plans and specifications.

RESOURCE

Feirer. **Carpentry and Building Construction**, pp. 737-738.

TEACHING ACTIVITIES

1. Read and discuss **Carpentry and Building Construction**, pp. 737-738.
2. Discuss the different types of plaster grounds.
3. Identify the locations of plaster grounds.
4. Describe the purposes of plaster grounds.
5. Demonstrate how to cut plaster grounds.
6. Demonstrate how to install plaster grounds.
7. Demonstrate how to remove when necessary.

PERFORMANCE OBJECTIVE 163

CRITERION-REFERENCED MEASURE

Questions

1. Plaster grounds are strips of ____________.
2. When plastering, plaster grounds are used as ___________.
3. Plaster ground along the bottom of a wall can be used for controlling the thickness of ___________.

Answers

1. Wood
2. Guides
3. Plaster

Practical Application

Have students install plaster grounds around all doors, windows, and wall openings. They must exceed 3/4 inches from wall, be plumbed at door openings, and conform to width of door jamb to allow good fit for casing.

Method of Evaluating Practical Application

Use Checklist Performance Objective 163 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 163 EVALUATION

INSTALLING PLASTER GROUNDS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications.		
2. Installed plaster grounds using one of the following methods: Plaster ground method a. Measured length of plaster ground required. b. Cut plaster ground to length. c. Nailed plaster ground to wall surface every 12 inches around all wall openings. Furring strip method a. Measured length of furring strip. b. Cut furring. c. Positioned furring strip along inside of opening so that 3/4 inch extends beyond wall surface. d. Nailed furring strip every 12 inches around all wall openings.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 164

TASK

Install parquet flooring

STANDARD OF PERFORMANCE OF TASK

Parquet flooring tiles should fit tightly together with each tile firmly attached to subfloor; expansion space must be left around vertical obstruction(s).

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Adhesive
Parquet flooring
Plans and specifications
Subfloor
Trowel

ENABLING OBJECTIVES

1. Use a standard tool kit.
2. Interpret plans and specifications.

RESOURCE

Feirer. **Carpentry and Building Construction**, pp. 816-817.

TEACHING ACTIVITIES

1. Read and discuss **Carpentry and Building Construction**, pp. 816-817.
2. Describe the history of parquet flooring.
3. Describe the various designs of parquet flooring.
4. Explain the manufacturing of parquet flooring.
5. Demonstrate the installation of parquet flooring.

PERFORMANCE OBJECTIVE 164

CRITERION-REFERENCED MEASURE

Questions

1. Parquet flooring was first used in the 14th Century in ___________.
2. Parquet flooring is made of ___________.
3. Parquet flooring can be installed in various ___________.

Answers

1. Europe
2. Hardwood
3. Designs

Practical Application

Have students install parquet flooring. The tiles should fit tightly together with each tile firmly attached to subfloor, expansion space must be left around vertical obstructions.

Method of Evaluating Practical Application

Use Performance Objective 164 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 164 EVALUATION

INSTALLING PARQUET FLOORING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications.		
2. Cleaned subfloor.		
3. Struck center line.		
4. Located midpoint of center line.		
5. Spread enough adhesive on floor working area.		
6. Set tile.		
7. Interlocked grooves of next tile tightly over tongues of preceding tiles.		
8. Hammered or tapped tiles with wood block if necessary for tight fit.		
9. Continued until floor is completed working from starting point.		
10. Cut tiles around vertical obstructions leaving space for expansion.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 165

TASK

Install plank flooring

STANDARD OF PERFORMANCE OF TASK

Plank flooring must cover floor area with spacing between rows for expansion; planks up to 4 inches wide must be attached every 24 to 32 inches with fasteners staggered; planks wider than 4 inches must be attached every 16 inches.

SOURCE OF STANDARD

Residential Carpentry, p. 591.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Building paper
Circular saw
Electric drill and bits
Fasteners
Nails
Planks
Plans and specifications
Subfloor
Wood cement
Wood plugs

ENABLING OBJECTIVES

1. Select direction for installing plank flooring.
2. Measure floor and amount of plank flooring needed.
3. Interpret plans and specifications.

RESOURCE

Durbahn. **Fundamentals of Carpentry**, p. 462.

TEACHING ACTIVITIES

1. Read and discuss **Fundamentals of Carpentry**, p. 462.
2. Compare the installation of plank flooring today with the installation of plank flooring during Colonial times.
3. Describe the various methods of installing of plank flooring.
4. Demonstrate how to install plank flooring.
5. Have a student demonstrate how to install plank flooring.

PERFORMANCE OBJECTIVE 165

CRITERION-REFERENCED MEASURE

Questions

1. Flooring installed in pieces 3 to 5 inches wide is known as ____________.
2. The thickness of plank flooring is 5/16 or ____________.
3. The edges and the ends of 25/32 inch flooring have tongues and ____________.

Answers

1. Plank flooring
2. 25/32
3. Grooves

Practical Application

Have students install plank flooring to cover floor area with spacing between rows for expansion. Planks up to 4 inches wide must be attached every 24 to 32 inches with fasteners staggered. Planks wider than 4 inches must be attached every 16 inches.

Method of Evaluating Practical Application

Use Checklist Performance Objective 165 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 165 EVALUATION

INSTALLING PLANK FLOORING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	**Unsatisfactory**
1. Determined direction of planking from plans and specifications.		
2. Cleaned subfloor.		
3. Installed building paper over subfloor.		
4. Measured and cut planks.		
5. Predrilled screw holes as necessary.		
6. Positioned plank.		
7. Nailed plank with fasteners staggered.		
8. Counter sunk nails.		
9. Installed screws in predrilled holes.		
10. Continued procedure until floor is complete.		
11. Cleaned screw holes.		
12. Covered heads with glue.		
13. Fitted wood plugs in holes.		

APPROVED: YES _____ NO ____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 166

TASK

Install tongue and groove flooring

STANDARD OF PERFORMANCE OF TASK

Flooring must be securely nailed at each joist with all joints tight; and end joints must be staggered on alternate rows.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Nails
Plans and specifications
Tongue and groove flooring
Wood block

ENABLING OBJECTIVES

1. Use a flooring nail gun.
2. Interpret plans and specifications.

RESOURCE

Feirer. **Carpentry and Building Construction**, pp. 799-811.

TEACHING ACTIVITIES

1. Read and discuss **Carpentry and Building Construction**, pp. 799-811.
2. Sketch a diagram of a piece of tongue and groove flooring.
3. Illustrate the layout of the individual pieces of a tongue and groove floor.
4. Demonstrate the types of fasteners used in the installation of tongue and groove flooring.
5. Demonstrate the installation of tongue and groove flooring.

PERFORMANCE OBJECTIVE 166

CRITERION-REFERENCED MEASURE

Questions

1. Joints should not be closer than __________.
2. To aid in the installation of the first course of tongue and groove flooring, snap a __________.
3. When nailing tongue and groove flooring, it is necessary to use a __________.

Answers

1. Six inches
2. Chalk line
3. Nail set

Practical Application

Have students install tongue and groove flooring. Flooring must be securely nailed at each joist with all joints tight and end joints staggered on alternate rows.

Method of Evaluating Practical Application

Use Checklist Performance Objective 166 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 166 EVALUATION

INSTALLING TONGUE AND GROOVE FLOORING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications.		
2. Struck chalk line according to direction of pattern.		
3. Cut floor board to length.		
4. Set board along chalk line.		
5. Nailed board at each joist through tongue angling nail back through board and driven tightly.		
6. Butted next floor board to end of preceding board.		
7. Nailed as in item 5.		
8. Continued until floor was complete.		
9. Drove boards with grooved edges tightly over tongues of preceding rows on all succeeding rows.		
10. Hammered boards together using wood block.		
11. Staggered end joints on alternate rows.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 167

TASK

Install suspended T-grid ceiling

STANDARD OF PERFORMANCE OF TASK

Ceiling must be level and supported according to manufacturer's specifications; and wall angles must overlap 1 inch.

SOURCE OF STANDARD

Residential Carpentry, p. 577.
Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Ceiling panels
Cross tees
Eye hooks
Main ties
Plans and specifications
Wall angles
Wire

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Measure areas.
3. Level a line.

RESOURCE

Koel. **Carpentry**, pp. 506-509.

TEACHING ACTIVITIES

1. Read and discuss **Carpentry**, pp. 506-509.
2. Demonstrate the various types of ceiling.
3. List the advantages of T-grid ceiling.
4. Demonstrate the quickness of the installation of T-grid ceiling.
5. Demonstrate how to install the grids.
6. Demonstrate how to take precautions in the installation of the panels.

PERFORMANCE OBJECTIVE 167

CRITERION-REFERENCED MEASURE

Questions

1. The ceiling tiles usually are 2 feet by 2 feet or ____________.
2. Using T-grid ceiling reduces noise from ____________.
3. Main tees must interlock at ____________.

Answers

1. 2 feet x 4 feet
2. Above
3. Ends

Practical Application

Have students install suspended T-grid ceiling. Ceiling must be level and supported according to manufacturer's specifications and wall angles must overlap 1 inch.

Method of Evaluating Practical Application

Use Checklist Performance Objective 167 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 167 EVALUATION

INSTALLING SUSPENDED T-GRID CEILING

Student's Name **Date**

DIRECTIONS TO STUDENT — Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR — Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications for ceiling height.		
2. Calculated and marked height of wall angle on wall near corners.		
3. Checked for level.		
4. Struck chalk line.		
5. Nailed wall angle with tops at chalk line overlapping at inside corners and mitering at outside corners.		
6. Laid out tee locations.		
7. Marked ceiling for wire hanger positions.		
8. Screwed eye hooks at marked locations.		
9. Hung wire from hooks.		
10. Measured distance for main tees.		
11. Cut main tees to length.		
12. Hung main tees from wire at specified level.		
13. Interlocked main tees at ends.		
14. Fitted cross tees between main tees.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 167 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
15. Measured distance from wall angles to main tees.		
16. Cut cross tees to length.		
17. Interlocked cross tees, resting ends on wall angles.		
18. Leveled gridwork.		
19. Wrapped wires to hold gridwork in place.		
20. Set full ceiling panels into gridwork.		
21. Measured dimensions of spacing needing partial panels.		
22. Cut panels to size.		
23. Set cut panels in place.		

APPROVED: YES _____ NO ____

Evaluator's Signature   Date

DUTY INSTALLING INTERIOR FINISHES

PERFORMANCE OBJECTIVE 168

TASK

Install tongue and groove ceiling tiles

STANDARD OF PERFORMANCE OF TASK

Ceiling tiles must squarely interlock with equal margins at walls.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Ceiling tiles
Furring strips
Nails
Plans and specifications
Staple gun
Staples

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Identify measurements related to tongue and groove ceiling.
3. Use standard tools.

RESOURCE

Koel. **Carpentry**, pp. 506-508.

TEACHING ACTIVITIES

1. Read and discuss **Carpentry**, pp. 506-508.
2. Identify some advantages of using ceiling, tongue and groove tiles.
3. Explain the materials used in the manufacturing of tongue and groove ceiling tiles.
4. Explain the installation procedures for tongue and groove ceiling tile.
5. Demonstrate the installation of tongue and groove ceiling tiles.

PERFORMANCE OBJECTIVE 168

CRITERION-REFERENCED MEASURE

Questions

1. For wood joist construction the center line must be ____________.
2. Standard size of a tongue and groove ceiling tile is ____________.
3. For a balanced appearance the border tiles at both ends of the room should be ____________.

Answers

1. Perpendicular to joist
2. 12 inches by 12 inches
3. The same size

Practical Application

Have students install tongue and groove ceiling tiles. Ceiling tiles must squarely interlock with equal margins at walls.

Method of Evaluating Practical Application

Use Checklist Performance Objective 168 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 168 EVALUATION

INSTALLING TONGUE AND GROOVE CEILING TILES

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications.		
2. Located centerline of ceiling. (NOTE: For wood joist construction, centerline must be perpendicular to joist.)		
3. Nailed furring strips along ceiling centerline.		
4. Nailed furring strips at increments from center strip to sides of ceiling depending on size of ceiling tile.		
5. Struck chalk line down center of furring strip closest to wall.		
6. Located centerline of ceiling perpendicular to furring.		
7. Marked increments along end furring strips from centerline to front wall according to size of ceiling tile.		
8. Struck chalk line at marks closest to front wall.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 168 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
9. Cut ceiling tile with utility knife so flanged edges line up with chalk line.		
10. Stapled flanged edges of corner tile to furring.		
11. Inserted tongue edge of subsequent tiles into groove edge of preceding tiles.		
12. Stapled flanges of tile to furring.		
13. Continued procedure until ceiling was completely covered.		

APPROVED: YES _____ NO ____

Evaluator's Signature Date

ASSEMBLING AND CONSTRUCTING STAIRS

DUTY ASSEMBLING AND CONSTRUCTING STAIRS

PERFORMANCE OBJECTIVE 169

TASK

Install prefabricated stairs

STANDARD OF PERFORMANCE OF TASK

Stairs must be level and nailed securely.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Framed stairwell
Nails
Plans and specifications
Prefabricated stairs

ENABLING OBJECTIVES

1. Use standard tools.
2. Read and interpret plans and specifications.

RESOURCE

Feirer. **Carpentry and Building Construction**, pp. 829-853.

TEACHING ACTIVITIES

1. Read and discuss **Carpentry and Building Construction**, pp. 829-853.
2. Define the common stair parts and terms.
3. Question the students about the stair parts and terms.
4. Have a student locate the location for a given set of stairs.
5. Demonstrate the installation of prefabricated stairs.

PERFORMANCE OBJECTIVE 169

CRITERION-REFERENCED MEASURE

Questions

1. The vertical face of one step is the ___________.
2. The horizontal face of one step is the ___________.
3. The protection on the open side of a run of stairs is the ___________.

Answers

1. Riser
2. Tread
3. Railing

Practical Application

Have students install prefabricated stairs. Stairs must be level and nailed securely.

Method of Evaluating Practical Application

Use Checklist Performance Objective 169 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 169 EVALUATION

INSTALLING PREFABRICATED STAIRS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans and specifications for stair placement.		
2. Marked plumb cuts on stringer ears.		
3. Cut all ears as marked.		
4. Marked floor cut as necessary.		
5. Lifted floor unit into place.		
6. Checked plumb and level and adjusted as necessary.		
7. Nailed through underside of stringer into wall studs.		
8. Secured at landings with nails.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY ASSEMBLING AND CONSTRUCTING STAIRS

PERFORMANCE OBJECTIVE 170

TASK

Install disappearing stair unit

STANDARD OF PERFORMANCE OF TASK

Unit must be installed securely and operate smoothly.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Disappearing stair unit
Framing lumber
Manufacturer's instructions
Nails
Wood screws

ENABLING OBJECTIVES

1. Interpret plans and specifications.
2. Use standard tool kit.
3. Evaluate strength of ceiling joints.

RESOURCE

Feirer. **Carpentry and Building Construction**, pp. 853-855.

TEACHING ACTIVITIES

1. Read and discuss **Carpentry and Building Construction**, pp. 853-855.
2. Examine attic floor and determine if floor is designed for regular floor loading.
3. Compare a disappearing stairway to other attic access opening.
4. Have a student determine the location of installation.
5. Demonstrate how to install disappearing stairway.

PERFORMANCE OBJECTIVE 170

CRITERION-REFERENCED MEASURE

Questions

1. The opening for installing a disappearing stairway should be of correct size and ___________.
2. Disappearing stairways may be purchased ready to ___________.
3. Disappearing stairways should be secured with ___________.

Answers

1. Square
2. Install
3. Wood screws

Practical Application

Have students install a disappearing stair unit. The unit must be secure and operate smoothly.

Method of Evaluating Practical Application

Use Checklist Performance Objective 170 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 170 EVALUATION

INSTALLING A DISAPPEARING STAIR UNIT

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Determined rough opening required as per manufacturer's instructions.		
2. Cut rough opening.		
3. Measured and cut headers.		
4. Nailed headers in position.		
5. Measured and checked opening for square.		
6. Located and drilled pilot holes for hinges as per manufacturer's instructions.		
7. Fitted stair unit in place.		
8. Secured stair unit with wood screws.		
9. Checked operation and adjusted if necessary.		
10. Measured and cut plywood trapdoor.		
11. Installed plywood trapdoor.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY ASSEMBLING AND CONSTRUCTING STAIRS

PERFORMANCE OBJECTIVE 171

TASK

Construct open riser stairs

STANDARD OF PERFORMANCE OF TASK

Stairway must be level and nailed securely; material-grade, and thickness must be as specified in plans.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Fasteners
Framed stairwell
Nails
Plans and specifications
Straight stock

ENABLING OBJECTIVES

1. Read and interpret plans and specifications.
2. Use standard tool kit.
3. Evaluate material quality.

RESOURCE

Durbahn. **Fundamentals of Carpentry**, pp. 465-485.

TEACHING ACTIVITIES

1. Read and discuss **Fundamentals of Carpentry**, pp. 465-485.
2. Explain the rise and run of open riser stairs.
3. Demonstrate how to measure, mark, and cut stringers.
4. Have a student measure and cut treads to size.
5. Demonstrate how to construct open riser stairs.

PERFORMANCE OBJECTIVE 171

CRITERION-REFERENCED MEASURE

Questions

1. Stairways are used to travel from one floor to ____________.
2. Many accidents are caused by faulty ____________.
3. The minimum headroom for a stairway is ______'______".

Answers

1. Another floor
2. Stairs
3. 6, 6

Practical Application

Have students construct open riser stairs. The open riser stairs must be level and nailed securely.

Method of Evaluating Practical Application

Use Checklist Performance Objective 171 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 171 EVALUATION

CONSTRUCTION OPEN RISER STAIRS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	**RATING**	
	Satisfactory	**Unsatisfactory**
1. Checked plans and specifications for stairway treatment.		
2. Checked level of upper floor.		
3. Measured rise and run of stairway.		
4. Calculated number, size of treads, and riser-openings.		
5. Calculated length of stringers.		
6. Measured and cut stringers to length.		
7. Marked tread placement on stringers.		
8. Cut out stringers for treads.		
9. Measured and cut treads to size.		
10. Nailed treads to stringers.		
11. Made plumb cuts and floor cuts.		
12. Lifted stairs into position.		
13. Checked for level and plumb and adjusted as necessary.		
14. Attached stairs to stairwell framing.		

APPROVED: YES ____ NO ____

Evaluator's Signature **Date**

DUTY ASSEMBLING AND CONSTRUCTING STAIRS

PERFORMANCE OBJECTIVE 172

TASK

Construct box stairs

STANDARD OF PERFORMANCE OF TASK

Stairway must be square and nailed securely; material-grade must be as specified in plans.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Circular saw
Clamps
Glue blocks
Nails
Plans and specifications
Router
Routing template
Scotia molding
Stringers
Treads and risers

ENABLING OBJECTIVES

1. Use standard tool kit.
2. Use power saw and router.
3. Interpret plans and specifications.

RESOURCE

Wagner. **Modern Carpentry**, pp. 405-420.

TEACHING ACTIVITIES

1. Read and discuss **Modern Carpentry**, pp. 405-420.
2. Estimate the length of the stairwell opening.
3. Calculate the riser height and determine the length of stringers needed.
4. Demonstrate how to draw the riser on a piece of 2"x12' stock.
5. Calculate the length of each tread.
6. Demonstrate how to construct box stairs.

PERFORMANCE OBJECTIVE 172

CRITERION-REFERENCED MEASURE

Questions

1. To construct box stairs you must know the length of the ____________.
2. The riser will determine the length of the ____________.
3. The three components of box stairs are treads, risers, and ____________.

Answers

1. Stairwell
2. Stringer
3. Stringers

Practical Application

Have students construct box stairs. The stairway must be square and nailed securely.

Method of Evaluating Practical Application

Use Checklist Performance Objective 172 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 172 EVALUATION

CONSTRUCTING BOX STAIRS

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked plans for stairway treatment.		
2. Checked level of upper floor.		
3. Measured rise and run of stairway.		
4. Calculated number and size of treads and risers.		
5. Calculated length of stringers.		
6. Marked floor line on stringer.		
7. Marked tread and rise locations on stringers.		
8. Made floor cut.		
9. Set routing template to dimensions.		
10. Clamped template into position along each tread line.		
11. Routed out shape of tread, riser, and wedges at each mark.		
12. Reversed template.		
13. Clamped template into position along each tread line of second stringers.		
14. Routed out shape of tread, riser, and wedges of second stringer at each mark.		

CHECKLIST FOR PERFORMANCE OBJECTIVE 172 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
15. Calculated tread and riser lengths.		
16. Measured and cut treads and risers.		
17. Measured and cut wedges.		
18. Assembled components (treads, riser, stringers).		
19. Slid treads into routed tread grooves.		
20. Coated long wedges with glue.		
21. Drove wedges into place to hold treads.		
22. Endnailed treads to stringer.		
23. Fitted risers into routed riser grooves.		
24. Coated short wedges with glue.		
25. Drove wedges in place to hold risers.		
26. Backnailed risers to treads.		
27. Glued edge of bottom riser in place.		
28. Installed (glued) glueblocks where risers fitted into threads.		
29. Installed scotia molding under nosing of treads as required.		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

DUTY ASSEMBLING AND CONSTRUCTING STAIRS

PERFORMANCE OBJECTIVE 173

TASK

Install wood newel post, balusters, and railing

STANDARD OF PERFORMANCE OF TASK

Installation must be plumb, level, and securely fastened.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Balusters
Electric drill and bits
Nails
Newel post
Plans and specifications
Railing material
Screws
Wedges

ENABLING OBJECTIVES

1. Use standard tool kit.
2. Measure and cut stock accurately.

RESOURCE

Wagner. **Modern Carpentry**, pp. 414-418.

TEACHING ACTIVITIES

1. Read and discuss **Modern Carpentry**, pp. 414-418.
2. Define a balustrade.
3. Identify the parts of a balustrade and explain where each is used.
4. Demonstrate the fasteneing techniques required.
5. Demonstrate the assembly and the installation of wood newel post, balusters, and railing.

PERFORMANCE OBJECTIVE 173

CRITERION-REFERENCED MEASURE

Questions

1. To fit a wooden newel you sometimes have to notch the ____________.
2. The newel is fastened to the floor by ____________.
3. The railing should be attached with ____________.

Answers

1. Bottom tread
2. Toe-nailing
3. Screws

Practical Application

Have students install wood newel post, balusters, and railings. Installation must be plumb, level, and securely fastened.

Method of Evaluating Practical Application

Use Checklist Performance Objective 173 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 173 EVALUATION

INSTALLING WOOD NEWEL POST, BALUSTERS, AND RAILING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Checked dimensions of post and railing material, and height and dimensions of each on plans and specifications.		
2. Cut newel to length.		
3. Set newel post into position and marked position.		
4. Shimmed base of newel post to plumb post.		
5. Marked location of grooves for stringer, tread, and riser.		
6. Routed grooves.		
7. Trimmed bottom riser to length.		
8. Notched bottom tread to fit newel.		
9. Glued tread and riser together.		
10. Fitted stringer in newel groove.		
11. Positioned newel so all grooves fit.		
12. Fitted tread-riser into opposite stringer.		
13. Checked newel for plumb.		
14. Toenailed newel to floor.		
15. Measured for length of rail(s).		

CHECKLIST FOR PERFORMANCE OBJECTIVE 173 EVALUATION

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
16. Cut bottom subrail.		
17. Nailed rail to specified locations.		
18. Checked plans for baluster spacing.		
19. Cut fillets to size.		
20. Beveled ends.		
21. Cut upper subrail to length.		
22. Marked baluster locations on rail.		
23. Wedged fillets.		
24. Fitted subrail over balusters.		
25. Glued and fitted fillets and balusters into bottom rail.		
26. Centered railing over subrail.		
27. Drilled holes through fillets into railing.		
28. Attached railing with screws.		
29. Attached end of railing to newel.		

APPROVED: YES _____ NO _____

Evaluator's Signature Date

DUTY ASSEMBLING AND CONSTRUCTING STAIRS

PERFORMANCE OBJECTIVE 174

TASK

Install metal newel post and railing

STANDARD OF PERFORMANCE OF TASK

Post and railing must be plumb, level, and securely fastened to subbase.

SOURCE OF STANDARD

Writing team of incumbent workers

CONDITIONS FOR PERFORMANCE OF TASK

Standard tool kit
Manufacturer's instructions
Newel post
Plans and specifications
Railing material

ENABLING OBJECTIVES

1. Use standard tool kit.
2. Measure and cut accurately.

RESOURCE

Wagner. **Modern Carpentry**, pp. 418-419.

TEACHING ACTIVITIES

1. Read and discuss **Modern Carpentry**, pp. 418-419.
2. Compare between the newel post and the railing.
3. Explain and define the types of fastening devices.
4. Have the students draw a diagram of a balustrade.
5. Demonstrate how to install metal newel post and railing.

PERFORMANCE OBJECTIVE 174

CRITERION-REFERENCED MEASURE

Questions

1. The railing is fastened to the ___________.
2. The newel post should be plumb and ___________.
3. Newel posts are fastened to ___________.

Answers

1. Newel post
2. Level
3. Subbase

Practical Application

Have students install metal newel post and railing. They must be plumb, level, and securely fastened to subbase.

Method of Evaluating Practical Application

Use Checklist Performance Objective 174 to determine if the assignment was completed accurately.

CHECKLIST FOR PERFORMANCE OBJECTIVE 174 EVALUATION

INSTALLING METAL NEWEL POST AND RAILING

Student's Name **Date**

DIRECTIONS TO STUDENT Prepare the proper equipment. Follow the verbal directions given by the instructor. Complete each step in the sequential order listed.

DIRECTIONS TO EVALUATOR Observe the student. Pay close attention to items to be evaluated. Be sure the student completes the tasks within a reasonable time. A score of 100 percent is required for competency.

ITEMS TO BE EVALUATED	RATING	
	Satisfactory	Unsatisfactory
1. Determined dimensions of post(s) and railing(s) from plans.		
2. Checked dimensions of subbase.		
3. Read manufacturer's instructions for prefabricated railing.		
4. Checked plans for detail.		
5. Set newel post(s) into position.		
6. Marked location of holes in flange plate on subbase.		
7. Prepared subbase to receive fasteners.		
8. Set newel post(s) into position.		
9. Fastened to subbase.		
10. Set railing section into position.		
11. Checked for plumb and level.		
12. Fastened railing to newel post(s).		

APPROVED: YES _____ NO _____

Evaluator's Signature **Date**

APPENDICES

APPENDIX A

TASK LIST AND JOB TITLES

APPENDIX A

TASK LIST AND JOB TITLES

Estimating Materials		PO/Page Number
1.	Estimate forming materials.	1/5
2.	Estimate concrete.	2/8
3.	Estimate concrete block.	3/11
4.	Estimate rough framing materials.	4/14
5.	Estimate roofing materials.	5/20
6.	Estimate windows.	6/24
7.	Estimate doors and jams.	7/27
8.	Estimate interior underlayment.	8/30
9.	Estimate interior paneling.	9/33
10.	Estimate stairway materials.	10/36
11.	Estimate closet accessories.	11/39
12.	Estimate acoustical ceiling material.	12/42
13.	Estimate prefabricated cabinets.	13/45
14.	Estimate material for built-ins.	14/48
15.	Estimate finish hardware.	15/51
16.	Estimate siding.	16/54

Preparing Building Site

1.	Establish elevation reference points from bench mark.	17/58
2.	Establish footing grade.	18/61
3.	Locate and square corners.	19/64
4.	Install batter boards.	20/67
5.	Set grade stakes.	21/70

Sharpening Tools

1.	Sharpen wood chisel.	22/74
2.	Hone plane iron.	23/77
3.	Sharpen circular saw blade.	24/81
4.	Sharpen twist drill.	25/85
5.	Sharpen auger bit.	26/88

Building and Installing Foundation Forms

1.	Construct stud and sheathing wall form.	27/92
2.	Erect plywood panel wall form.	28/95
3.	Erect manufactured wall form.	29/99
4.	Construct stair form.	30/102
5.	Construct box for specified opening.	31/105
6.	Construct footing form.	32/108
7.	Strip form.	33/111
8.	Install beam.	34/114
9.	Install anchor bolt in concrete.	35/117
10.	Install anchor bolt in concrete block.	36/120
11.	Install bulkhead.	37/123
12.	Install expansion and contraction joint in concrete slab.	38/126

Building and Installing Foundation Forms **PO/Page Number**

13. Install expansion and contraction joint in concrete wall. 39/129
14. Install keyway for footing and foundation. 40/132
15. Screed concrete. 41/135
16. Waterproof concrete block wall. 42/138

Installing Rough Framing

1. Stack lumber. 43/142
2. Construct single-pole scaffold. 44/145
3. Construct double-pole scaffold. 45/148
4. Install sill plate. 46/152
5. Frame wall. 47/155
6. Align and brace wall. 48/158
7. Construct plywood box beam. 49/161
8. Install diagonal bracing (wind brace). 50/164
9. Frame floor opening. 51/167
10. Frame door opening. 52/170
11. Frame window opening. 53/173
12. Frame roof opening. 54/176
13. Frame built-up stringer. 55/179
14. Frame cleated stair stringer. 56/182
15. Install floor joists. 57/185
16. Install cross-bridging. 58/188
17. Install ceiling joists. 59/191
18. Construct post and beam framing. 60/194
19. Install steel beam. 61/199
20. Install lally post. 62/202
21. Install backing for hanging fixture and cabinet. 63/205
22. Install exterior wall sheathing. 64/208
23. Install batten. 65/211
24. Install plyscore subflooring. 66/214
25. Install metal studs. 67/217
26. Set metal door frame for masonry construction. 68/220
27. Set metal window frame for masonry construction. 69/223
28. Construct roof truss. 70/226
29. Install collar beams. 71/229
30. Install overhang purlin. 72/232
31. Install rafter support purlin. 73/235
32. Install ridgeboard. 74/238
33. Install common rafters. 75/241
34. Install tail rafters. 76/245
35. Install cripple jack rafters. 77/248
36. Install hip rafter. 78/251
37. Install hip jack rafters. 79/254
38. Install valley rafter. 80/258
39. Install valley jack rafters. 81/262

Installing Rough Framing **PO/Page Number**

40. Install gambrel roof rafters. 82/265
41. Frame dormer without sidewalls. 83/268
42. Frame dormer with sidewalls. 84/272
43. Frame roof saddle. 85/276
44. Frame snub gable. 86/279
45. Install gable studs. 87/283
46. Construct intersecting gable roof. 88/286
47. Install roof sheathing. 89/290

Installing Roof Components

1. Install roofing felt. 90/294
2. Install chimney flashing. 91/297
3. Install valley flashing. 92/301
4. Install composite strip shingles. 93/304
5. Install composite shingles on ridge cap. 94/307
6. Install composite shingles in valley. 95/311
7. Install composite shingles around roof opening. 96/314
8. Install shingles over dormer or roof appendage. 97/317
9. Install roof vent. 98/320
10. Install ridge vent. 99/323
11. Install skylight. 100/326
12. Install wood shingle/shakes. 101/329
13. Install wood shingle/shakes on ridge cap. 102/333
14. Install wood shingle/shakes in valley. 103/337
15. Install wood shingle/shakes around roof opening. 104/340
16. Install gutter(s). 105/343
17. Install downspout (leader). 106/346

Installing Exterior Finishes

1. Construct box cornice. 107/350
2. Construct rake cornice. 108/354
3. Case exterior opening. 109/357
4. Install wood jamb window unit. 110/360
5. Hang exterior door. 111/363
6. Install exterior door jamb. 112/367
7. Install metal corner for aluminum or vinyl siding. 113/370
8. Install corner board for wood siding. 114/373
9. Install wood fascia. 115/377
10. Install wood soffit. 116/380
11. Install aluminum fascia. 117/383
12. Install aluminum soffit. 118/386
13. Install prefabricated column. 119/389
14. Install garage door. 120/392
15. Install metal or vinyl siding. 121/396

Installing Exterior Finishes

		PO/Page Number
16.	Install prefabricated storm unit.	122/399
17.	Install drip cap.	123/402
18.	Install bevel siding.	124/405
19.	Install wood shingle siding.	125/408
20.	Install outside corner of wood shingle siding.	126/411
21.	Install panel siding.	127/414
22.	Construct and install wood louvers.	128/417
23.	Install fixed exterior shutters.	129/420

Installing Interior Finishes

1.	Install batt insulation.	130/424
2.	Install vapor barrier.	131/427
3.	Install wood paneling.	132/430
4.	Assemble prefabricated cabinet.	133/433
5.	Install closet accessories.	134/436
6.	Install interior door jamb.	135/439
7.	Construct built-in cabinet.	136/442
8.	Install shelving.	137/445
9.	Install baseboards.	138/449
10.	Install ceiling molding.	139/452
11.	Hang drywall.	140/455
12.	Case interior opening.	141/459
13.	Hang interior door.	142/462
14.	Install prehung door unit (split jamb).	143/466
15.	Install double-acting door.	144/469
16.	Install folding (accordian) door.	145/472
17.	Install sliding door.	146/475
18.	Install bi-fold door.	147/478
19.	Install pocket door.	148/481
20.	Install cylinder lockset.	149/485
21.	Install mortise lockset.	150/489
22.	Install closer.	151/493
23.	Install door holder.	152/496
24.	Install panic bar.	153/499
25.	Install flush bolt.	154/502
26.	Install door plate.	155/505
27.	Install weatherstripping.	156/508
28.	Install wall cabinet.	157/511
29.	Install base cabinet.	158/514
30.	Install recessed medicine cabinet.	159/517
31.	Install threshold.	160/520
32.	Install gypsum lath.	161/523
33.	Install corner beading.	162/526
34.	Install plaster grounds.	163/529
35.	Install parquet flooring.	164/532
36.	Install plank flooring.	165/535
37.	Install tongue and groove flooring.	166/538
38.	Install suspended T-grid ceiling.	167/541
39.	Install tongue and groove ceiling tiles.	168/545

Assembling and Constructing Stairs	PO/Page Number
1. Install prefabricated stairs.	169/550
2. Install disappearing stair unit.	170/553
3. Construct open riser stairs.	171/556
4. Construct box stairs.	172/559
5. Install wood newel post, balusters and railing.	173/563
6. Install metal newel post and railing.	174/567

APPENDIX B

DEFINITION OF TERMS

APPENDIX B

DEFINITION OF TERMS

A number of terms frequently used in this guide may be unfamiliar to the reader; others may be familiar, but in the context of this handbook have been assigned special meanings.

AFFECTIVE.

Skills which emphasize an attitude, feeling, emotion, or degree of acceptance and rejection.

CATALOG.

A comprehensive collection of performance objectives, performance guides, and related data developed in a specific domain.

CBVE (COMPETENCY-BASED VOCATIONAL EDUCATION).

A methodology of instruction that (a) identifies the abilities and skills needed for on-the-job performance; (b) informs students and teachers of the precise and detailed learning objectives required to achieve these competencies; (c) emphasizes performance standards in testing, course requirements, and/or graduation; and (d) facilitates learning by letting each student master the tasks prior to advancing to another.

CHECKPOINT.

A point in the development of the V-TECS product when material must be sent to V-TECS central office for quality review.

CIP (CLASSIFICATION OF INSTRUCTION PROGRAM) CODE.

A code developed by the U.S. Office of Education to identify a specific cluster of related jobs for training program identification.

COGNITIVE.

Skills which emphasize the recall of knowledge and development of intellectual abilities.

COMPETENCY.

Proficiency in the knowledge and skills required of workers in a particular occupation or occupational specialty; a term used by educators to mean essentially program goal, duty, task, or objective. In some cases the terms are essentially synonymous.

CONDITIONS.

Describes the situation for competent task performance, including tools and equipment to be used, and limitations under which the tasks will be performed.

CONSORTIUM.

A group of state agencies, institutions, or other entities which have been legally constituted through letters of commitment, agreements, or by assignment of higher authorities to work together toward the solution of problems in education. A consortium, for the purposes of this work, must have membership from autonomous agencies and institutions which cut across state boundaries as they attempt to solve problems or meet goals.

CRITERION-REFERENCED MEASURES.

An evaluative procedure used to determine if a student has mastered a performance objective.

CROSS-REFERENCE TABLE.

A table that identifies the relationship among duties and tasks found in the occupational inventory and the performance objectives in the final catalog. Also noted are percentages of incumbents performing the tasks by D.O.T.

CURRICULUM GUIDE.

An instructional resource developed from a V-TECS catalog to guide CBVE for an occupation.

DICTIONARY OF OCCUPATIONAL TITLES (D.O.T.).

A document published by the U.S. Department of Labor, Employment and Training Administration. This publication groups occupations into systematic occupational classification structures based on interrelationships of job tasks and requirements.

DISTRACTOR.

An incorrect response to a multiple-choice or true/false test item.

DOMAIN (OCCUPATIONAL DOMAIN).

A group of job titles that are related on the basis of required skills and knowledge.

D.O.T. CODE.

A nine-digit number used to identify a specific job within a given calendar year.

DUTY.

A cluster of related tasks performed by incumbent workers in an occupational domain.

ENABLING OBJECTIVE.

An objective related to background knowledge or skills that are prerequisite to the mastery of a given task.

FIELD REVIEW.

The process of using and refining drafts of V-TECS materials for the purpose of identifying content errors or technical problems.

GUIDE SHEET.

Instructional information including the duty, performance objective, task,. performance of standard, survey of standard, conditions for performance of tasks, enabling objectives, resources, teaching activities, criterion-reference measures, and performance guide.

JOB.

A group of tasks performed by a job incumbent.

JOB INCUMBENT.

An individual who is currently employed in an occupation.

OCCUPATIONAL ANALYSIS (Task Analysis).

The process of reviewing elements of a job for the purpose of improving training program content across program levels of vocational-technical education.

OCCUPATIONAL INVENTORY(Task Inventory Booklet).

A survey instrument listing tasks performed and tools and equipment used by job incumbents in an occupational domain.

OCCUPATIONAL SURVEY.

The procedures for collecting data to identify the duties and tasks that comprise one or more jobs, job types, or career field ladders for the collection and analysis of information concerning such duties.

O.E./CIP CODE.

A code developed by the U.S. Office of Education to identify a specific cluster of related jobs for training program identification.

PERFORMANCE-BASED INSTRUCTION.

Instruction which requires the learners demonstration of specific competencies. The desired abilities are selected before the instruction is described and are clearly defined as observable performance objectives.

PERFORMANCE CHECKLIST.

A list of performance steps derived from the performance guide to record acceptable or unacceptable performance of each step of a task.

PERFORMANCE GUIDE (PG).

A series of steps required for performance of a task arranged in the sequence ordinarily followed.

PERFORMANCE OBJECTIVE (PO).

A statement, in precise measurable terms, of a particular behavior to be exhibited by a learner under specified conditions, including a standard of performance.

PSYCHOMOTOR.

Skills which emphasize manipulation of material or tools.

QUALITY REVIEW.

A review of content by V-TECS staff or designated representative to examine quality of content, format, and style of V-TECS product(s).

RESOURCES.

Materials which are used to develop instruction and/or learner-specific objectives.

SOURCE OF STANDARD.

A person or origin from which the information establishing the standard is received.

STANDARD.

The criteria used to determine if a task has been successfully or unsuccessfully performed.

STATE-OF-THE-ART REFERENCE.

Current materials from which information or resources can be found to facilitate instruction.

STATE-OF-THE-ART (SOA) STUDY.

Research conducted to determine the current status of performance-based instructional materials and practices in the domain area under study and to obtain other information that might be useful in catalog development.

SUBJECT-MATTER EXPERT.

A highly experienced person(incumbent worker/instructor) who assists in identifying task performance steps, skills, and knowledge necessary to perform the job.

TASK.

A unit of work activity which constitutes logical and necessary steps in the performance of a duty. A task has a definite beginning and ending point in its accomplishments and generally consists of two or more definite steps.

TASK ANALYSIS.

The process of reviewing elements of a job for the purpose of improving training program content across program levels of vocational technical education.

TASK LIST.

A list of tasks performed by incumbents in a specific occupation domain.

TEACHING ACTIVITIES.

Methods and/or procedures for delivering instructional content to students.

TEST-ITEM BANK.

A collection of criterion-referenced test items coded for input and retrieval by computer or manual methods.

VALIDATION.

The process of assuring that all aspects of an occupational task analysis identifies the skills, knowledge, and attitudes performed in the occupation.

VERIFICATION.

The procedure of collecting data to substantiate an existing product; for example, task list verification.

V-TECS.

An acronym representing: Vocational-Technical Education Consortium of States; 795 Peachtree Street, N.E., Atlanta, Georgia 30365. A consortium of states that provide competency-based, vocational-technical education materials while conserving time and money through shared development and dissemination.

V-TECS CATALOG.

An incumbent-based description of the duties, tasks, performance objectives, performance guides, and related data in a specified occupation.

WORKING CONDITIONS.

The atmospheric and environmental conditions under which a worker performs a specific job.

WRITING TEAM.

A team of people representing instructors with subject matter expertise; persons having knowledge and experience in developing criterion-referenced measures; local or state supervisors in the domain being developed; workers and supervisors of incumbent workers whose function is to analyze occupational data and develop performance objectives for specific D.O.T. areas.

APPENDIX C

TOOLS AND EQUIPMENT

APPENDIX C

TOOLS/EQUIPMENT/WORK AIDS

BY PERCENTAGE OF INCUMBENTS USING
(n = 84)

Equipment Number	Equipment Description	Percentage Using	Number Using
28	Chalk line	97.6	82
32	Combination square	97.6	82
30	Circular saw	95.2	80
25	Carpenter's level	94.0	79
45	Electric drill	94.0	79
117	Safety goggles	94.0	79
155	Utility knife	94.0	79
100	Pry (crow) bar	92.9	78
149	Tool box	92.9	78
1	Adjustable wrench	90.5	76
87	Measuring tape(s)	90.5	76
99	Plumb bob and magnet	90.5	76
58	Folding wood rule	89.3	75
37	Crosscut saw	88.1	74
148	Tin snips	88.1	74
59	Framing square rafter	86.9	73
97	Phillips screwdriver	86.9	73
162	Wood chisel	86.9	73
31	Cold chisel	85.7	72
63	Hacksaw	84.5	71
20	Builder's level	82.1	69
38	Curved claw hammer	81.0	68
125	Sledge hammer	81.0	68
56	Flat file	79.8	67
55	Flat (speed) bit	77.4	65
157	Vise grips	77.4	65
3	Auger bit	76.2	64
18	Brace	76.2	64
109	Rip claw hammer	75.0	63
139	Step ladder	75.0	63
15	Block plane	72.6	61
89	Nail claw	72.6	61
153	Try square	72.6	61
27	"C" clamp	71.4	60
54	Extension ladder	71.4	60
71	Hex head (Allen) wrench	71.4	60
75	Keyhole saw	71.4	60
79	Level-transit	71.4	60

Equipment Number	Equipment Description	Percentage Using	Number Using
122	Scriber(s)	71.4	60
144	Straightedge	71.4	60
26	Caulking gun	70.2	59
90	Nail set	70.2	59
94	Oilstone (whetstone)	70.2	59
116	Saber saw	70.2	59
121	Screwdriver bit	69.9	57
4	Automatic screwdriver	69.0	58
14	Blade tip screwdriver	69.0	58
36	Countersink	69.0	58
86	Masonry bit	67.9	57
140	Straight claw hammer	67.9	57
152	Transit	67.9	57
163	Wood glue	65.5	55
34	Coping saw	64.3	54
120	Scratch awl	64.3	54
124	Side cutter	64.3	54
164	Wood rasp	64.3	54
16	Bolt cutter	61.9	52
29	Channellock pliers	61.9	52
57	Floor chisel	61.9	52
130	Socket set wrench	61.9	52
154	Twist drill	61.9	52
66	Hammer holster	60.7	51
67	Hand broom	60.7	51
103	Putty knife	60.7	51
17	Box end wrench	59.5	50
95	Open-end wrench	59.5	50
101	Push broom	59.5	50
39	Diagonal pliers	58.3	49
53	Expansive bit	58.3	49
72	Hole saw bit	58.3	49
88	Miter box	58.3	49
111	Ripping bar	58.3	49
68	Hand drill	57.1	48
50	Electric screwdriver	56.0	47
110	Rip saw	54.8	46
114	Router	53.6	45
147	Three-cornered file	53.6	45
48	Electric plane	52.4	44
49	Electric rotary hammer	52.4	44
146	Table saw	52.4	44
19	Brick chisel	50.0	42
73	Jack plane	50.0	42
150	Torpedo level	50.0	42
160	Wheelbarrow	50.0	42
7	Belt sander	48.8	41
42	Drill points	47.6	40

Equipment Number	Equipment Description	Percentage Using	Number Using
119	Scraper	47.6	40
102	Push drill	46.4	39
113	Round point shovel	45.2	38
92	Needle nose pliers	44.0	37
107	Reciprocating saw	44.0	37
33	Combination wrench	41.7	35
65	Half-round file	41.7	35
80	Line level	41.7	35
112	Round file	41.7	35
126	Sliding T-bevel	41.7	35
133	Spiral ratchet screwdriver	41.7	35
21	Butt gage	40.5	34
82	Lockset bit	40.5	34
138	Star drill	40.5	34
10	Bench grinder	39.3	33
23	Cabinet screwdriver	39.3	33
64	Half-hatchet hammer	39.3	33
105	Radial arm saw	39.3	33
137	Square point shovel	38.1	32
8	Bench bar clamp	36.9	31
70	Hand vibrator sander	36.9	31
98	Pin punch	36.9	31
46	Electric miter box	35.7	30
74	Jointer	35.7	30
115	Rubber mallet	33.3	28
127	Slip joint pliers	33.3	28
129	Smooth plane	33.3	28
69	Hand screw clamp	32.1	27
81	Linoleum knife	32.1	27
93	Off-set screwdriver	32.1	27
108	Rip chisel	32.1	27
142	Straight punch	32.1	27
134	Spirit level	31.0	26
159	Water level	31.0	26
2	Air compressor	29.8	25
145	Surform plane	29.8	25
22	Cabinetmaker's plane	28.6	24
40	Disc sander	28.6	24
104	Rabbet plane	28.6	24
6	Bandsaw	27.4	23
84	Marking gage	27.4	23
143	Straight rule	27.4	23
47	Electric mortiser	26.2	22
60	Glass cutter	26.2	22
136	Square file	26.2	22
12	Bench rule	25.0	21
91	Nailing gun	25.0	21

Equipment Number	Equipment Description	Percentage Using	Number Using
11	Bench pipe clamp	23.8	20
76	Knife file	23.8	20
96	Orbital sander	23.8	20
135	Spring clamp	23.8	20
156	Utility vise	23.8	20
9	Bench brush	21.4	18
77	Laser beam level	21.4	18
41	Dovetail saw	20.2	17
61	Glue gun	20.2	17
165	Wood vise	20.2	17
43	Drill press	19.0	16
106	Rafter and brace table	19.0	16
144	Stripping chisel	19.0	16
35	Cornering tool	17.9	15
151	Trammel points	17.9	15
44	Drywall hammer	16.7	14
161	Wing dividers	16.7	14
5	Ball peen hammer	15.5	13
24	Cant file	15.5	13
78	Leather strap	14.3	12
158	Wallboard circle cutter	14.3	12
51	Electric stapler	13.1	11
13	Bench twin rod clamp	11.9	10
123	Skip auger bit	11.9	10
131	Soft-faced hammer	11.9	10
166	Yardstick	10.7	9
83	Magnetic punch	9.5	8
62	Gluing table	8.3	7
128	Slitting file	7.1	6
132	Spindle shaper	7.1	6
85	Mason's modular rule	6.0	5
118	Sand scoop	6.0	5
52	Electric tenon	4.8	4

STANDARD TOOL KIT

A "standard tool kit" for Carpenter, as indicated in the Performance Objectives, includes the following tools:

Adjustable wrench
Augers
Ball bearing brace
Block plane
Butt markers
Caulking gun
Chalk
Chalk box
Combination square
Coping saw
Crescent wrench
Crosscut saw
Drill
Drill bits
Dryline
Expansion bit
Fine-grit oilstone
Folding rule
Glue
Hacksaw
Hammer
Hatchet
Jack plane
Keyhole saw
Level
Marking gage
Marking scriber
Medium-grit oilstone
Nailset
Oil
Pencil
Phillips screwdriver
Pinch bar
Plumb bob
Ratchet screwdriver
Screwdriver bit
Scriber
Side cutter
Smooth plane
Snaptie wrench
Solid screwdriver
Steel tape
Steel framing square
Tin snips
Tool box
Utility knife
Wood chisels
Wood rasp

APPENDIX D

SOURCES OF STANDARDS

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APPENDIX E

STATE-OF-THE-ART LITERATURE

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APPENDIX F

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